

Service Manual

hp StorageWorks 1000ux/1900ux/2300ux and 3800ux/7100ux Optical Jukebox

Second Edition (September 2004)

Part Number: AA969-90904

This guide describes procedures for removing and replacing FRUs, and troubleshooting the HP StorageWorks 1000ux/1900ux/2300ux and 3800ux/7100ux Optical Jukebox.



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About this Guide

This service manual provides information to help you:

- Troubleshoot the jukebox.
- Remove and replace Field Replaceable Units (FRUs).

“About this Guide” topics include:

- [Related documentation](#), page 6
- [Conventions](#), page 7
- [Getting help](#), page 9

Related documentation

In addition to this guide, HP provides corresponding information:

For 1000ux/1900ux/2300ux models:

- The *HP StorageWorks 1000ux/1900ux/2300ux Optical Jukebox Getting Started Poster* provides an installation overview.
- The *HP StorageWorks 1000ux/1900ux/2300ux Optical Jukebox Setup Guide* provides detailed information on installing the jukebox.
- The *HP StorageWorks 1000ux/1900ux/2300ux Optical Jukebox Users Guide* provides information on operating the jukebox.
- The *HP StorageWorks 1000ux/1900ux/2300ux Optical Jukebox Conversion Guide* provides detailed procedures for converting from an MO jukebox to a UDO or mixed media jukebox.

For 3800ux/7100ux models:

- The *HP StorageWorks 3800ux/7100ux Optical Jukebox Getting Started Poster* provides an installation overview.
- The *HP StorageWorks 3800ux/7100ux Optical Jukebox Setup Guide* provides detailed information on installing the jukebox.
- The *HP StorageWorks 3800ux/7100ux Optical Jukebox Users Guide* provides information on operating the jukebox.
- The *HP StorageWorks 3800ux/7100ux Optical Jukebox Conversion Guide* provides detailed procedures for converting from an MO jukebox to a UDO or mixed media jukebox.

Conventions

Conventions consist of the following:

- Document conventions
- Text symbols
- Equipment symbols

Document conventions

This document follows the conventions in [Table 1](#).

Table 1: Document conventions

Convention	Element
Blue text: Figure 1	Cross-reference links
Bold	Menu items, buttons, and key, tab, and box names
<i>Italics</i>	Text emphasis and document titles in body text
Monospace font	User input, commands, code, file and directory names, and system responses (output and messages)
<i>Monospace, italic font</i>	Command-line and code variables
Blue underlined sans serif font text (http://www.hp.com)	Web site addresses

Text symbols

The following symbols may be found in the text of this guide. They have the following meanings:



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.



Caution: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

Tip: Text in a tip provides additional help to readers by providing nonessential or optional techniques, procedures, or shortcuts.

Note: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings:



Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of personal injury from electrical shock hazards, do not open this enclosure.



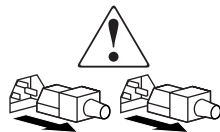
Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of personal injury from a hot component, allow the surface to cool before touching.



Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of personal injury from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.



Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Getting help

If you still have a question after reading this guide, contact an HP authorized service provider or access one of the following web sites:

- <http://www.hp.com>.
- <http://www.hp.com/go/udo>

HP technical support

Telephone numbers for worldwide technical support are listed on the following HP web site: <http://www.hp.com/support/>. From this web site, select the country of origin.

Note: For continuous quality improvement, calls may be recorded or monitored.

Be sure to have the following information available before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP storage web site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: <http://www.hp.com/country/us/eng/prodserv/storage.html>. From this web site, select the appropriate product or solution.

HP authorized reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518
- In Canada, call 1-800-263-5868
- Elsewhere, see the HP web site for locations and telephone numbers: <http://www.hp.com>.

Troubleshooting and Diagnostics

1

This chapter describes the following:

- [Troubleshooting common problems](#), page 12
- [Retrieving log history](#), page 17
- [Running an internal test](#), page 21
- [Recovery procedures for specific hardware errors](#), page 24
- [Micro-move error codes](#), page 31
- [Description of the robotic micro-moves](#), page 34
- [Using HP StorageWorks Library and Tape Tools](#), page 42

Troubleshooting common problems

If the procedures in [Table 2](#) do not address or resolve your problem, visit <http://www.hp.com/go/udo> for additional assistance, or contact HP technical support (see “Getting help” on page 9).

Table 2: Troubleshooting installation

Problem	Solution
Power	
Jukebox will not power on	<ul style="list-style-type: none"> ■ Check that the power indicator light on the control panel is on. If it is not, make sure the power switch on the front panel (for models 1000ux/1900ux/2300ux) or side panel (for models 3800ux/7100ux) is on. ■ Replace the power cord.
The power-on selftest failed and DEVICE FAILED displays	<ul style="list-style-type: none"> ■ Power cycle the jukebox. ■ If the power-on test continues to fail, press ENTER, write down the displayed error code and a micro move error, and contact your support representative.
Power to the jukebox failed while a disk was in the drive and the display did not return to READY after the power came back on	<ul style="list-style-type: none"> ■ Power cycle the jukebox. ■ If READY does not display (power-on test is unsuccessful), switch off the power and contact your support representative. <hr/> <p>Caution: Do not move the unit! Moving the unit risks damaging the optical drive.</p> <hr/>
No display messages appear	<ul style="list-style-type: none"> ■ Ensure that the power cord is connected. ■ Ensure that the power switch is on. ■ Power cycle the jukebox.

Table 2: Troubleshooting installation (Continued)

Problem	Solution
Host computer system does not recognize the jukebox or the drives	<ul style="list-style-type: none"> ■ Ensure the jukebox is not in an error or failed state. If so, troubleshoot the error before continuing. ■ Ensure the jukebox is connected and powered on. The jukebox must be on when booting the host computer for the jukebox to be recognized. ■ If the jukebox is the last device on the SCSI bus, check that it has been terminated and that the maximum cable length has not been exceeded. ■ Check SCSI ID assignments and resolve any conflicts. ■ Ensure you are connected to the correct SCSI bus type. UDO jukeboxes are LVDS devices. ■ If using a narrow (8-bit) HBA, make sure that all addresses are in the range 0 through 7. ■ For Windows operating systems, use the device manager to rediscover the jukebox. ■ For HP-UX, use <code>ioscan</code> to verify that the HBA and attached devices are claimed. ■ For other operating systems, refer to the system administrators guide for diagnosing missing peripherals. ■ Check that the application software is compatible with the jukebox. ■ Check that the device is present on the system using HP StorageWorks Library & Tape Tools, available from http://www.hp.com/support/tape_tools. ■ Power cycle the jukebox and power down the host. Wait until the jukebox completes its power cycle before powering up the host. ■
Connection	
Other SCSI devices no longer work when the jukebox is installed	<ul style="list-style-type: none"> ■ Check SCSI ID assignments and resolve any conflicts. ■ Ensure that the SCSI ID for the HBA is different from that of the jukebox. ■ Check for proper SCSI cabling and termination. ■ Ensure the maximum cable length for the bus has not been exceeded (12 meters for LVDS and 3 meters for SE).

Table 2: Troubleshooting installation (Continued)

Problem	Solution
Media	
A disk is stuck in a drive	<ul style="list-style-type: none"> ■ Attempt to unload the disk using your application software. ■ If unsuccessful, contact your service representative.
Cannot write to a disk	<ul style="list-style-type: none"> ■ Check the host file system access permissions. ■ Eject the disk and check that the write-protect tab on each side of the disk is in the write-enabled position. ■ If unsuccessful, contact your service representative.
LOAD ERROR or FAILED displays when a disk is inserted into the mailslot	<ul style="list-style-type: none"> ■ Press CANCEL. Insert the disk into the mailslot again. ■ If the light bar on the control panel is amber, cycle power to the jukebox. When READY displays, try loading the disk again. ■ If unsuccessful, contact your service representative.
INCOMPATIBLE displays when a disk is loaded.	An attempt was made to load an incompatible disk into the drive. Ensure that you use UDO disks in UDO drives, and MO disks in MO drives.
RESERVED displays when a disk is inserted into the mailslot	The SECURE MS configuration is set. Disks cannot be loaded. To change this setting, refer to the User's Guide.
MAILSLOT EMPTY displays when a disk is inserted into the mailslot	<ul style="list-style-type: none"> ■ Remove and then replace the disk fully into the mailslot. ■ If the same error reappears, then the mailslot sensors are not detecting a disk and may be defective. Contact your service representative.
DEST NOW FULL displays when a disk is inserted into the mailslot	<p>The jukebox moved a disk into the slot you chose before your load command executed.</p> <ul style="list-style-type: none"> ■ Press CANCEL, select another slot for the disk, and then reattempt a load. ■ Initiate an INIT ELEM STATUS test (see "Internal tests" on page 21).
TRANSPORT FULL displays when a disk is inserted into the mailslot	<ul style="list-style-type: none"> ■ The disk transport mechanism already contains a disk. Refer to your host and application software documentation for recovery procedures. ■ Attempt an EMPTY PICKER test (see "Internal tests" on page 21). ■ If unsuccessful, contact your support representative.

Table 2: Troubleshooting installation (Continued)

Problem	Solution
MAILSLOT SENSOR displays when a disk is inserted into the mailslot	<ul style="list-style-type: none"> ■ Remove and then re-insert the disk. ■ If unsuccessful, the jukebox mailslot sensors may have failed. Contact your service representative.
EJECT ERROR displays when a disk eject is attempted	<ul style="list-style-type: none"> ■ Press CANCEL. Attempt to eject the disk again. ■ If the light bar on the control panel is amber, cycle power to the jukebox and try to eject the disk again when READY displays. ■ If there is no disk in the mailslot and this error message repeats, contact your service representative.
RESERVED displays when a disk eject is attempted	<p>The application software reserved the element for its use or a security configuration was set to prevent disk ejection.</p> <ul style="list-style-type: none"> ■ Refer to the User's Guide for setting an operating configuration. ■ Attempt the operation using your application software.
EMPTY * displays when a disk eject is attempted	<p>This is not an error. There are no disks in the jukebox.</p>
TRANSPORT FULL displays when a disk eject is attempted	<ul style="list-style-type: none"> ■ The disk transport mechanism already contains a disk. Refer to your host and application software documentation for recovery procedures. ■ Attempt an EMPTY PICKER test (see "Internal tests" on page 21). ■ If unsuccessful, contact your service representative.
SOURCE NOW EMPTY displays when a disk eject is attempted	<p>The application software moved the disk from the slot you chose before your eject command executed.</p> <ul style="list-style-type: none"> ■ Press CANCEL. You may have to wait for the application software to replace the disk into the slot before attempting another eject. ■ Initiate an INIT ELEM STATUS test (see "Internal tests" on page 21).
MAILSLOT FULL displays when a disk eject is attempted	<p>A disk is in the mailslot. To remove the disk, select EJECT *, select the slot you want the disk ejected from again, and eject the disk.</p>

Table 2: Troubleshooting installation (Continued)

Problem	Solution
Operation	
Forgot the password	<ul style="list-style-type: none"> ■ Enter the default password (000 000 000). ■ If unsuccessful, contact your service representative.
You want to stop a test that is running	Press CANCEL . The current test loop continues until finished, then the test stops.

Retrieving log history

READY > ADMIN* > INFO*

To display information stored in the jukebox operating logs:

1. With READY displaying on the control panel, press **NEXT** until ADMIN* displays.
2. Enter the administration password (see the *User's Guide* if needed).
3. TEST* displays. Press **NEXT** until INFO* displays, and then press ENTER.
4. Press **NEXT** until the name of the log you want to access displays and then press **ENTER**.
5. After you are finished viewing log information, press **CANCEL** to return to READY.

Information logs are described in [Table 3](#).

Table 3: Information logs

Log name	Description
REVISION	Jukebox firmware version number.
JUKEBOX* <ul style="list-style-type: none">■ PRODUCT #■ SN #■ FW TYPE ##■ DRIVES #■ SLOTS #	Pressing ENTER allows you to select from the following: Product identification string Serial number of the unit. <i>For factory use only.</i> Code that identifies the type of firmware used in the unit. Number of drives in the unit. Number of storage slots in the unit.
JKBX ODOMETERS* <ul style="list-style-type: none">■ HOURS■ MOVES■ FLIPS■ XLATES■ ROTATES	Pressing ENTER allows you to select from the following: Number of operation hours (time the power was on). Some of the time may be while in power reduction mode. Total moves and move attempts by the disk transport mechanism. Total disk transport mechanism flips. Total disk transport mechanism horizontal moves. Total mailslot rotations.
DRIVE LOADS* <ul style="list-style-type: none">■ DRIVE #■ DRIVE FW*■ DRIVE SN*	Pressing ENTER allows you to select from the following: Total disk loads for the drive numbered "#." Press ENTER to select the logs under this selection. Press ENTER to select the logs under this selection.

Table 3: Information logs (Continued)

Log name	Description
HARD ERROR*	Log of unrecoverable errors (commands that did not successfully complete). Returns either NO HARD ENTRIES or ENTRY #. (There may be multiple hard error numbers.) Press ENTER to view the log for the currently displayed error, or press NEXT to select the next error.
SOFT ERROR*	Log of recovered errors (commands that did not complete successfully). Returns either NO SOFT ENTRIES or ENTRY #. (There may be multiple soft error numbers.) Press ENTER to view the log for the currently displayed error, or press NEXT to select the next error.
RECOVERY ERROR*	Log of errors during the most recent move. Returns either NO ENTRIES or the number of recovery errors. Press ENTER to view the log for the currently displayed error, or press NEXT to select the next error.
■ *HARDWARE ERR #	Internal diagnostics error number for the failure.
Note: FRUs are listed to show where to focus the troubleshooting efforts. The FRUs are not listed to suggest that the components need replacement.	
— *FRU 1 #	Field replaceable unit most likely to be at fault.
— *FRU 2 #	Field replaceable unit second most likely to be at fault.
— *FRU 3 #	Field replaceable unit third most likely to be at fault.
— MOTION <name>	<name> indicates one of the following types of movements taking place in the jukebox at the time of the failure: <ul style="list-style-type: none"> ■ EXCHANGE ■ MOVE ■ POSITION ■ INIT ELEM ■ REZERO ■ ROTATE ■ DIAGNOSTIC ■ RESTORE
— SOURCE #	SCSI element number to which the source refers. (This information is valid for MOVE, EXCHANGE, and POSITION movements only.)
— DESTINATION 1 #	SCSI element to which the first destination refers. (This information is valid for MOVE and EXCHANGE movements only.)

Table 3: Information logs (Continued)

Log name	Description
— DESTINATION 2 #	SCSI element to which the second destination refers. (This information is valid for the EXCHANGE movement only.)
— ODOMETER #	Move number in which the error occurred.
— *MICROMOVE 1 #	First jukebox micro-move for the original move command issued prior to the failure.
— *MICROMOVE 2 #	Second jukebox micro-move for the original move command issued prior to the failure.
— *MICROMOVE 3 #	Third jukebox micro-move for the original move command issued prior to the failure.
— *MICROMOVE 4 #	Fourth jukebox micro-move for the original move command issued prior to the failure.
— *MICROMOVE 5 #	Fifth jukebox micro-move for the original move command issued prior to the failure.
— *MICROMOVE 6 #	Sixth jukebox micro-move for the original move command issued prior to the failure. (This is the last to be logged.)
<ul style="list-style-type: none"> ■ *MICROMOVE ER # ■ TOP or BOTTOM PICKER ■ NORTH or SOUTH THUMB 	<p>Micro-move error that occurred.</p> <p>Displays either TOP or BOTTOM indicating which side of the disk transport mechanism was active at the time of the error.</p> <p>Displays either NORTH or SOUTH indicating which thumb on the transport mechanism was active at the time of the error.</p>

List of suspect FRUs

If a hard failure or a recovered failure occurs, a list of possible FRUs that may have been at fault is returned.

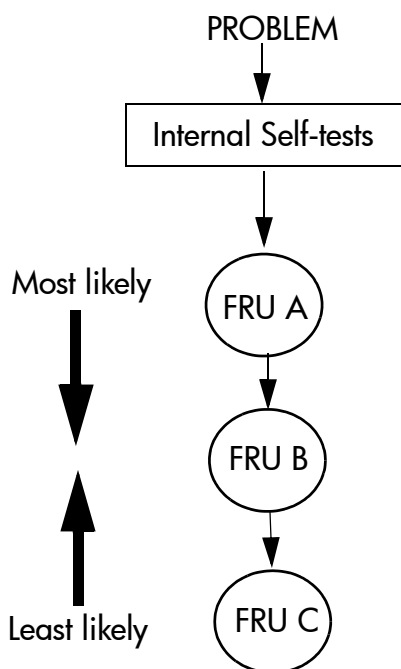


Figure 1: Suspect FRUs

How suspect FRUs are evaluated

Similar to treating symptoms rather than the real problem, the suspect FRUs given by the FRU isolation procedure may actually mask the root cause of the problem.

The hard move error that caused the robotics to run the FRU isolation test may only be a product of the actual problem. Blindly and repeatedly replacing the suspect FRU(s) will not reliably solve a problem.

If you consider the suspect FRU as a pointer to the problem area rather than the problem itself, an educated visual inspection should reveal the real problem.

A good visual inspection requires an understanding of how the jukebox normally operates. To understand what the robotics do in normal operation, run the various movements available from the control panel and watch it closely. Reading the descriptions in [Table 7 “Micro-move IDs and expanded descriptions”](#) on page 34 will also help you understand the small moves that comprise jukebox operation.

Running an internal test

READY > ADMIN* >TEST*

This section describes self-diagnostic tests that are available on the jukebox.



Caution: Diagnostic tests should be run only by an authorized service representative. Descriptions of the self-diagnostic tests are included in this manual *for information purposes only*. If not properly completed, some of the internal diagnostic tests can corrupt your file system. In some rare instances, your service representative may request that you run specific tests to provide information before they come to your site, or you may receive a control panel message to run a specific test.

1. With READY displaying on the control panel, press **NEXT** until ADMIN* displays.
2. Enter the administration password (see the *User's Guide* if needed).
3. TEST* displays. Press **ENTER**.
4. Press **NEXT** until the name of the test you want to run displays and then press **ENTER** to start the test.

Note: You may press **CANCEL** at any time to abort a test. A delay may occur while the current test loop completes.

Table 4: Internal tests

Test Name	Description
EXCHANGE DEMO	<i>Used by service personnel only. Do not run this test if the jukebox contains disks with file system data on them.</i> This test moves randomly-chosen optical disks to random storage slot locations. This test displays FAIL if there are no disks in the jukebox or if all storage slots are full. For best results, the jukebox should contain as many disks as there are drives, plus two additional disks. The transport and mailslot must be empty. For mixed media jukeboxes, this test requires two disks of each media type (MO and UDO).
INIT MECHANICS	Runs the FIND PLUNGE HOME , FIND VERTICAL HOME , FIND XLATE HOME , and INIT ELEM STATUS tests. Each test is run one time per test loop.
INIT ELEM STATUS	Physically scans the entire unit to determine which storage slots contain disks and if the drives contain disks. This test appears as ISTAT TEST in all control panel error messages.
MAGAZINE IO	Makes a combination of moves with a PASS/FAIL result. It moves an optical disk from a randomly-chosen full slot to a randomly-chosen empty slot with a random flip. It then moves the disk back to its original storage slot with its original orientation. This test displays FAIL if there are no disks in the jukebox or if all storage slots are full. The drives and mailslot must be empty.

Table 4: Internal tests (Continued)

Test Name	Description
DRIVE IO	Makes a combination of moves with a PASS/FAIL result. It moves an optical disk from a randomly-chosen full slot to a randomly-chosen drive with a random flip. It then moves the cartridge back to its original slot with its original orientation. This test displays FAIL if there are no disks in the jukebox or if all storage slots are full. The drives and mailslot must be empty. For mixed media jukeboxes, this test requires one disk of each media type (MO and UDO).
MAILSLOT IO	Makes a combination of moves with a PASS/FAIL result. It moves an optical disk from the lowest-numbered full slot to the mailslot with a random flip. It then moves the cartridge back to its original slot with its original orientation. This test displays FAIL if there are no disks in the jukebox or if all storage slots are full. The drives and mailslot must be empty.
VERTICAL TEST	Moves the disk transport mechanism up and down the full length of the rail. Returns PASS/FAIL. No disks are required.
TRANSLATE TEST	Moves the disk transport mechanism from side to side. No disks are required.
FLIP TEST	Makes a combination of moves with a PASS/FAIL result. Flips the disk transport mechanism at various locations. No disks are required.
PICKER TEST	Flips the disk transport mechanism and switches active thumbs. No disks are required.
FIND PLUNGE HOME	Calibrates the disk transport mechanism, establishes the mechanism's orientation, and determines the reference points in the picker travel path. Assumes that the mechanics and servo system are functional. No disks are required.
FIND VERT HOME	Recalibrates the vertical position of the disk transport mechanism and verifies that the vertical path is clear. No disks are required.
FIND XLATE HOME	Calibrates the reference points for the side-to-side motion of the disk transport mechanism. No disks are required.
VERTICAL ENCODER	Moves the disk transport mechanism down to the lower stop, moves it back up a short distance, and then moves it back down. On the second downward motion the number of digital pulses is counted and verified. Returns PASS/FAIL. No disks are required.
EMPTY DRIVES	<i>Used by service personnel only. Do not run this test if the jukebox contains disks with file system data on them.</i> Moves disks out of the drive mechanism(s) and returns them to their home storage slot locations if the locations are known. If the home storage location is not known, the jukebox moves the disks into the first available empty storage slot.
EMPTY PICKER	Moves a disk from the disk transport mechanism to its home storage slot location if that location is known, otherwise the disk is placed into the first available empty storage slot.
FILL PICKER	<i>Used by service personnel only. Do not run this test if the jukebox contains disks with file system data on them.</i> Moves a disk into the disk transport mechanism from the first storage slot containing a disk. This test must be run twice to fill both containers in the disk transport mechanism.

Table 4: Internal tests (Continued)

Test Name	Description
EXERCISE MECH	Runs the VERTICAL TEST, TRANSLATE TEST, FLIP TEST, MAGAZINE IO, DRIVE IO, and MAILSLLOT IO tests. Each test runs one time per test loop.
WELLNESS TEST	Checks the general capability of the jukebox. Requires one loaded disk. The drives, transport, and mailslot must be empty. Runs INIT MECHANICS and EXERCISE MECHANICS. Each test runs one time per test loop.
CLEAR SOFT LOG	<i>Used by service personnel only.</i> Sets the soft error log to zero.
CLEAR HARD LOG	<i>Used by service personnel only.</i> Sets the hard error log to zero.
PLUNGE FULL SPD	Allows the disk transport mechanics to run at full speed. This setting should always be used in normal jukebox operation.
PLUNGE 1/2 SPD	<i>Used by service personnel only.</i> Allows the disk transport mechanics to run at half speed.
PLUNGE 1/4 SPD	<i>Used by service personnel only.</i> Allows the disk transport mechanics to run at quarter speed.
MAILSLOT SENSORS	Displays the current state of the mailslot sensors. If a sensor is not blocked, a "0" is displayed. If a sensor is blocked, an "*" is displayed. The display automatically updates when the status changes.
STARWARS	The display shows 0 0 0. Each "0" indicates one of the paths that the disk transport mechanism follows in front of each stack of optical disks. If the path is clear, a "0" displays; if the path is blocked (because of an optical disk that is not inserted fully into its storage slot for example), an "*" will be displayed. This display is automatically updated if the status changes.
BOTTOM THUMB	<i>Used by service personnel only.</i> Reports THUMB A, THUMB B, or NO THUMB. Looks at the top and bottom thumb sensors and reports whether the thumbs on the disk transport mechanism are in the forward or back position. If THUMB A or THUMB B is returned, the specified thumb is the forward position. If NO THUMB is returned, both thumbs are in the back position.
TOP THUMB	<i>Used by service personnel only.</i> Reports ON or OFF. Looks at the top thumb sensor which reports whether or not the thumb that is currently on the top side of the disk transport mechanism is in the forward position. If ON is reported the thumb is in the back position; if OFF is reported the thumb is in the forward position.
TRANSLATE SENSOR	Reports ON or OFF after looking at the translate calibration sensor. Display automatically updates if the status changes.
MEDIA TYPE	This is available only in a mixed-media (MO and UDO) unit. Moves all of the disks in the jukebox, except those in drives, to the media test station, then back to their original positions to determine the drive compatibility of all of the disks.

Recovery procedures for specific hardware errors

When a hardware failure occurs, a message displays on the control panel. If the failure occurs during the power-on sequence, **DEVICE FAILED** displays. If the failure occurs when loading a disk you may see **LOAD ERROR** or **FULL**. If a failure occurs while you are running a test, **TEST FAILED** displays. When you press **ENTER**, the jukebox displays information about the hardware failure from the error log.

The jukebox firmware can detect broken components such as a dead motor, but if failures are due to marginal or random problems, the failing component may induce errors in other components. For example, if the electronics produce an intermittent error or if friction increases on a part, different components of the jukebox may appear to fail. Several error codes may be displayed as a result of one problem.

[Table 5](#) shows the hardware error codes possible and recovery procedures for specific hardware errors.

Table 5: Hardware errors verification/recovery

Error Code (hex)	Verification/Recovery Procedures
01 ROM checksum error	Errors 01 to 07 are only possible on power-up. Replace the controller PCA.
02 Register error	See error 01.
03 Microprocessor error	See error 01.
04 Controlled area of RAM checksum error	See error 01.
05 RAM test error	See error 01.
06 SCSI chip error	See error 01.
07 Jukebox controller chip error	See error 01.
0F ID configuration module failure	Occurs if: <ul style="list-style-type: none"> ■ A configuration module for another model of jukeboxes is installed ■ The configuration module was removed while power was on ■ the configuration module chip failed during periodic polling Check the SLOTS display under INFO * / JUKEBOX * menu for correct number of slots detected for the jukebox.

Table 5: Hardware errors verification/recovery (Continued)

Error Code (hex)	Verification/Recovery Procedures
10h Invalid drive configuration	<p><i>For 1000ux/1900ux/2300ux models:</i></p> <ul style="list-style-type: none"> ■ A 32-slot UDO jukebox must have two UDO drives in positions 1 and 2. ■ A 64-slot UDO jukebox must have UDO drives in all four drive positions. ■ A 64-slot mixed media jukebox must have UDO drives in positions 1 and 2, and MO drives in positions 3 and 4. <hr/> <p>Note: The MO drives in mixed media jukeboxes must be 9-Gbyte (14x) versions and have current firmware.</p> <hr/> <p><i>For 3800ux/7100ux models:</i></p> <ul style="list-style-type: none"> ■ A 4-drive UDO jukebox must have UDO drives in the first four drive positions. ■ A 6-drive UDO jukebox must have UDO drives in the first six drive positions. ■ A 10-drive UDO jukebox must have four UDO drives on the upper bus in positions 1 through 4, and six UDO drives on the lower bus. ■ A 10-drive, mixed media jukebox must have six UDO drives on the upper bus in positions 1 through 6, and four MO drives on the lower bus in positions 7 through 10. The bottom drive positions must hold the media detect station. <hr/> <p>Note: The MO drives in mixed media jukeboxes must be 9-Gbyte (14x) versions and have current firmware.</p> <hr/>
11h Drive serial communications failure	<ol style="list-style-type: none"> 1. Check drive cabling. 2. In a mixed media jukebox, make sure all MO drives are 9-Gbyte (14x) versions.
1E Translate motor error	<p>Cannot translate the picker and/or sense that it has moved.</p> <ol style="list-style-type: none"> 1. Run FIND XLAT HOME test from the control panel. 2. If the picker does not move at all, check the connections on the umbilical cable. If the connections are good and the picker still does not move, change the umbilical cable. 3. If the picker moves a little but does not reach the side of the frame, the translate motor on the picker is probably defective. Change the picker. 4. If the picker moves properly to the side, the translate sensor is probably defective. Change the picker.

Table 5: Hardware errors verification/recovery (Continued)

Error Code (hex)	Verification/Recovery Procedures
1F Vertical motor error	Occurs when trying to sense a move of the carriage assembly. <ol style="list-style-type: none"> If the translate assembly moves -- and you get a failure -- that means that it is not reading the encoder strip. Make sure the encoder strip is inside sensor. If the translate assembly doesn't move -- it probably is the motor leads, motor, or 24-volt power supply. <ol style="list-style-type: none"> Make sure the motor leads are connected to the vertical motor. Check that the cable from the sensor is connected through the translate frame to the umbilical cable for the picker. Change the vertical motor. Change the 24-volt power supply. Change the controller PCA.
20 Plunge motor error	<ol style="list-style-type: none"> Change the jukebox controller PCA Change the picker Check the plunge motor leads
28 Mailslot sensor error	<ol style="list-style-type: none"> Run the Mailslot I/O Test to see if sensors are registering or if they are intermittent Check the mailslot-to-interposer cable. Change the interposer PCA. Change the mailslot.
2B Top thumb sensor error	<ol style="list-style-type: none"> Change the picker. Change the umbilical cable. Change the controller PCA.
2C Bottom thumb sensor error	<ol style="list-style-type: none"> Change the picker. Change the umbilical cable. Change the controller PCA.
32 Invalid test number	User error.
33 Invalid configuration	User error. There might not be enough cartridges in the jukebox.
34 Need to initialize element status	Run Init Elem Status.
35 Exercise test failed	Run Exercise test again, watch where it fails. Continue troubleshooting from the movement/operation that failed.
36 Elements reserved	User error. The host probably has the jukebox elements reserved.

Table 5: Hardware errors verification/recovery (Continued)

Error Code (hex)	Verification/Recovery Procedures
3C Move to	Vertical motion failed in the middle of a move or exchange <ol style="list-style-type: none"> 1. Look at the micro-move error of the failure in the error log (under INFO *, and Hardware Error in the control panel display). Also check the Source and Destination entries in the error log to verify what move was in process. 2. Make sure the encoder strip is inside sensor 3. Make sure the motor leads are connected to the vertical motor. 4. Check that the cable from the sensor is connected through the translate from to the umbilical cable for the picker.
3D Flip	Change the picker.
3E Translate	Change the picker.
3F Put cartridge in	Failed plunging cartridge into a slot <ol style="list-style-type: none"> 1. Look at the micro-move error of the failure in the error log (under INFO * and Hardware Error in the control panel display). 2. Check that the picker assembly looks normal and is in the proper orientation. 3. Check that the picker is in the proper height with respect to the storage slot and that the vertical encoder strip is not damaged.
40 Get cartridge out	Failed extracting a cartridge from a slot. <ol style="list-style-type: none"> 1. Look at the micro-move error of the failure in the error log (under INFO * and Hardware Error in the control panel display). 2. Check that the picker assembly looks normal and is in the proper orientation. 3. Check that the picker is in the proper height with respect to the storage slot and that the vertical encoder strip is not damaged.
41 Test magazine	Failed testing the magazine portion during an ISTAT. <ol style="list-style-type: none"> 1. Look at the micro-move error of the failure in the error log (under INFO * and Hardware Error in the control panel display) 2. Check that the picker assembly looks normal and is in the proper orientation. 3. Check that the picker is in the proper height with respect to the storage slot and that the vertical encoder strip is not damaged.
42 Put cartridge in a drive	Failed inserting a cartridge into a drive. <ol style="list-style-type: none"> 1. Look at the micro-move error of the failure in the error log (under INFO * and Hardware Error in the control panel display). 2. For mixed media jukeboxes, verify that the media type matches the drive type (MO to MO or UDO to UDO). 3. Remove rear panel and run the Wellness Test, Drive I/O test, and Exercise Mechanics test. Note where the problem occurs. If it is with the drive, change the drive. If it is a picker error, change the picker.

Table 5: Hardware errors verification/recovery (Continued)

Error Code (hex)	Verification/Recovery Procedures
43 Get cartridge from a drive	<p>Failed extracting a cartridge from a drive.</p> <ol style="list-style-type: none"> 1. Look at the micro-move error of the failure in the error log (under INFO * and Hardware Error in the control panel display). 2. Remove rear panel and run the Wellness Test, Drive I/O test, and Exercise Mechanics test. Note where the problem occurs. If it indicates the drive, change the drive. If it indicates a picker error, change the picker.
44 Test drive	<ol style="list-style-type: none"> 1. Look at the micro-move error of the failure in the error log (under INFO * and Hardware Error in the control panel display). 2. Remove rear panel and run the Wellness Test, Drive I/O test, and Exercise Mechanics test. Note where the problem occurs. If it is with the drive, change the drive. If it is a picker error, change the picker.
45 Put mailslot in	<ol style="list-style-type: none"> 1. Cycle power to the jukebox to initiate a poweron test sequence. 2. Check to see if mailslot rotation works. If the mailslot rotates in, change the picker. If the mailslot does not rotate in, change the mailslot.
46 Get mailslot out	<ol style="list-style-type: none"> 1. Cycle power to the jukebox to initiate a poweron test sequence. 2. Check to see if mailslot rotation works. If the mailslot rotates in, change the picker. If the mailslot does not rotate in, change the mailslot.
47 Test mailslot	<ol style="list-style-type: none"> 1. Cycle power to the jukebox to initiate a poweron test sequence. 2. Check to see if mailslot rotation works. If the mailslot rotates in, change the picker. If the mailslot does not rotate in, change the mailslot.
48 Rotate mailslot in	<ol style="list-style-type: none"> 1. Cycle power to the jukebox to initiate a poweron test sequence. 2. Check to see if the mailslot rotates. If the mailslot rotates in, change the picker. If the mailslot does not rotate in, change the mailslot.
49 Rotate mailslot out	<ol style="list-style-type: none"> 1. Cycle power to the jukebox to initiate a poweron test sequence. 2. Check to see if mailslot rotation works. If the mailslot rotates in, change the picker. If the mailslot does not rotate in, change the mailslot.
4A Test picker	<p>This may appear when testing for a cartridge in the picker during an ISTAT.</p> <p>Replace the picker.</p>
4B Switch active picker	<ol style="list-style-type: none"> 1. Check for loose cables 2. Replace the picker.
4C Restore picker	<ol style="list-style-type: none"> 1. Check for loose cables 2. Replace the picker.

Table 5: Hardware errors verification/recovery (Continued)

Error Code (hex)	Verification/Recovery Procedures
4D Find translate home	<p>Cannot translate the picker and/or sense that it has moved.</p> <ol style="list-style-type: none"> 1. Run FIND XLAT HOME test from the control panel. 2. If the picker does not move at all, check the connections on the umbilical cable. If the connections are good and the picker still does not move, change the umbilical cable. 3. If the picker moves a little but does not reach the side of the frame, the translate motor on the picker is probably defective. Change the picker. 4. If the picker moves properly to the side, the translate sensor is probably defective. Change the picker.
4E Find vertical home	<p>Because a motor test is called before a "find vertical home" is attempted, the vertical motor is assumed to be at least minimally functional</p> <ol style="list-style-type: none"> 1. Check that the vertical path is physically clear. 2. Make sure that the cartridges are fully inserted into their slots. 3. Change the vertical motor.
4F Find plunge home	Change the picker.
50 Clear flip area	<p>The vertical path is probably blocked and the picker might be falsely overforcing.</p> <ol style="list-style-type: none"> 1. Check that the path is clear. 2. Exercise and visually check the operation of the vertical motor.
51 Clear magazine path	<ol style="list-style-type: none"> 1. Check that the path from the picker to the magazine is clear. 2. Check that the vertical path is clear. 3. Test the vertical path sensor operation.
52 Clear drive path	<ol style="list-style-type: none"> 1. Check that the path from the picker to the drive is clear. 2. Check that the vertical path is clear. 3. Test the vertical path sensor operation.
53 Clear mailslot path	<ol style="list-style-type: none"> 1. Check that the path from the picker to the drive is clear. 2. Check that the vertical path is clear. 3. Test the vertical path sensor operation.
5B Finish switching the picker	Change the picker.
5C Wait plunge	Change the picker.
5D Wait vertical	<p>Vertical motion failed in the middle of a move or exchange.</p> <ol style="list-style-type: none"> 1. Look at the micro-move error of the failure in the error log (under INFO * [Hardware Errors] in the control panel display). Also check the Source and Destination entries in the error log to verify what move was in process. 2. Make sure the encoder strip is inside sensor. 3. Make sure the motor leads are connected to the vertical motor. 4. Check that the cable from the sensor is connected through the translate from to the umbilical cable for the picker.

Table 5: Hardware errors verification/recovery (Continued)

Error Code (hex)	Verification/Recovery Procedures
5E Powerfail clear path	<ol style="list-style-type: none"> 1. Check that all paths are clear. 2. Test the vertical path sensor operation.
5F Powerfail restore cartridges	<p>A cartridge was physically moved after powerfail and before powerfail recovery.</p> <p>Check that no cartridges have been moved.</p>
60 Repeater controller	<ol style="list-style-type: none"> 1. Check cables between the controller PCA and the SCSI repeater PCA. 2. Check the external cables. 3. Change repeater PCA. 4. Change the controller PCA. 5. Change internal SCSI cable
61 External SCSI cables	<ol style="list-style-type: none"> 1. Check for correct terminator (single-ended or differential) for the type of SCSI interface chosen. 2. Change external SCSI cable. 3. Change SCSI repeater PCA. 4. Change the controller PCA.
62h Test media	<p>The test of media type in a mixed media unit failed.</p> <p><i>For 1000ux/1900ux/2300ux models:</i></p> <p>Verify that the media detect station is installed in the correct position, below drive 3.</p> <p><i>For 3800ux/7100ux models:</i></p> <p>Verify that the media detect station is installed in the correct position, below drive 10.</p>

Micro-move error codes

Table 6: Micro-move error codes

Micro-Move Error Code (hex)	Description
01	Vertical over voltage exceeded limit set by firmware
02	Vertical over force exceeded limit set by firmware
03	Vertical servo error
04	Vertical time-out
05	Vertical open path
06	Vertical closed path
0A	Plunge over voltage exceeded limit set by firmware
0B	Plunge over force exceeded limit set by firmware
0C	Plunge servo error
0D	Plunge servo error
0E	Plunge open path
0F	Plunge closed path
10	Top picker expected to be active picker in plunge (run-time)
11	Bottom picker expected to be active picker in plunge (run-time)
12	Bottom thumb expected to be active in plunge home (powerup)
13	Top thumb expected to be active in plunge home (powerup)
14	Translate over voltage exceeded limits set by firmware
15	Translate over force exceeded limits set by firmware
16	Translate servo error
1E	No load complete
1F	Unexpected load complete
20	Unexpected cartridge in drive
21	No cartridge in drive
22	Drive put in accept failed
23	Drive get out accept failed
24	Drive eject failed
25	Drive insert failed
26	Drive eject retry
27	Drive insert retry
28	Clear drive path
29	Drive signal (not used)
2A	Drive not connected
32	Magazine put in saturate failed
33	Magazine get out saturate failed
34	Magazine put in accept failed
35	Magazine get out accept failed

Table 6: Micro-move error codes (Continued)

Micro-Move Error Code (hex)	Description
36	Magazine measure failed
37	Test magazine failed
38	Return magazine failed
39	Clear magazine path
3C	Mailslot put in saturate failed
3D	Mailslot get out saturate failed
3E	Mailslot put in accept failed
3F	Mailslot get out accept failed
40	Measurement of mailslot depth failed
41	Recovery did not clear vertical path
42	Rotate mailslot in failed
43	Rotate mailslot out failed
46	Flipped too far
47	Did not flip far enough
48	Flip side incorrect
50	Failed to finish a translate
51	Extra force needed to translate
5A	Command received to rotate mailslot but both pickers are full
5B	Back sensor in mailslot is bad
5C	Front sensor in mailslot is bad
5D	Command received to eject from the mailslot, but both pickers are full
5E	Attempt to load from an empty mailslot
5F	Engaging the mailslot failed on a rotate in
60	Disengaging the mailslot failed on a rotate in
61	Rotate in catch error (not used)
62	Rotate in push out error (not used)
63	Rotate in armed failed (not used)
64	Did not detect hard stop on a rotate in
65	Rotate in was too much distance
66	Engaging the mailslot failed on a rotate out
67	Disengaging the mailslot failed on a rotate out
68	Did not detect hard stop on a rotate out
69	Rotate out distance was too short
6A	Could not move thumbs out of the vertical path after a rotate out
6B	Vertical distance difference detected after error recovery
6C	Cartridge in mailslot incorrectly at rotate in
6D	Mailslot rotate in accept fail

Table 6: Micro-move error codes (Continued)

Micro-Move Error Code (hex)	Description
6E	Test failed
6F	Media type test failed
70	Picker full

Description of the robotic micro-moves

Table 7: Micro-move IDs and expanded descriptions

Micro-Move ID (hex)	Description
1	Move picker transport up. Fast.
2	Move picker transport down. Fast.
3	Move picker transport up slowly, checking for resistance. Used in the vertical find home sequence.
4	Move picker transport down slowly, checking for resistance. Used in the vertical find home sequence.
5	Move a small amount upward to relieve tension in the servos. Used after finding "home" in the vertical find home sequence.
6	Make a small vertical movement as a plunge is made into a drive. Used to "wiggle" the picker during error recovery.
8	Move picker transport up to the top of the jukebox, checking for a clear path. Used in the vertical find home sequence.
9	Move picker transport to the bottom of the jukebox, checking for a clear path. Used in the vertical find home sequence.
11	Move slowly up far enough to establish that there is enough room to flip the picker. Used in the plunge find home sequence.
12	Move slowly down far enough to establish that there is enough room to flip the picker. Used in the plunge find home sequence.
13	Move slowly to the flip clear area (determined in micro-moves 11 and 12). Used in the plunge find home sequence. Also used in power fail recovery to move the picker off of a cartridge that was between the picker and the magazines when the power failed and the picker settled.
14	Move slowly downward to the flip clear area (determined in micro-moves 11 and 12). Used in the plunge find home sequence.
15	Move vertically to restore the picker to the position it had before an error (and error recovery, occurred). Only called in error recovery.
16	Move up. Used in the motor test during powerup.
17	Move down. Used in the motor test during powerup.
62	Move slowly to one side of the translate frame. Used to find translate home during powerup. Movements after powerup use the translate home ID, 63.
63	Move to one side of the translate frame. Used to find translate home.
67	Move a short distance back from the plunge position where an overforce shutdown error occurred. Relaxes the tension.
68	Retract the plunge assembly on the picker all the way back to find "home" in the plunge axis. May start a flip, depending on starting position. (One of three plunge find homes in the sequence; 68, 69, 6A).
69	Retract the plunge assembly on the picker all the way back and flip the picker at the same time. Used to find "home" in the plunge axis. (One of three plunge find homes in the sequence; 68, 69, 6A).
6A	Retract the plunge assembly on the picker all the way back and then flip the picker. Used to find "home" in the plunge axis. Second flip of the sequence. (One of three plunge find homes in the sequence; 68, 69, 6A).
6B	Plunge toward magazine to get cartridge.

Table 7: Micro-move IDs and expanded descriptions (Continued)

Micro-Move ID (hex)	Description
6C	First time plunge into magazine (first “get”). Feels for resistance to learn the distance to the cartridge when it is seated.
6D	Retraction to pull the cartridge out of the magazine.
6F	First part of a two-step move to put a cartridge into a magazine. Puts the cartridge nearly all the way in. Next part of move is micro-move 70.
70	Second part of a two-step move to put a cartridge into a magazine. Continues movement of micro-move 6F and puts the cartridge in the rest of the way (the distance learned in micro-move 6C).
71	First time plunge into a magazine (first “put”). Feels for resistance to learn the distance to the cartridge when it is seated.
72	Retract picker plunge assembly after putting cartridge into a magazine. Assembly is retracted just far enough that the thumbs are clear of the picker vertical path.
75	First part of a two-step plunge move to put a cartridge into a drive. Cartridge is inserted to a point where the drive shutter arms start to engage.
76	First time “put” plunge into a drive. Slow. Feels for resistance to learn the distance to the cartridge when it is seated.
77	First time “get” plunge into a drive. Slow. Feels for resistance to learn the distance to the cartridge when it is seated.
78	Fast “put” plunge into a drive (distance has been previously learned).
79	Retract picker plunge assembly after putting cartridge into drive. Assembly is retracted just far enough to that the thumbs are clear of the picker vertical path.
7C	(Used in an emergency cartridge eject). Plunge toward a drive, stopping at a position close to the drive. This the wait position until the drive ejects the cartridge.
7D	(Used in an emergency cartridge eject). Plunge to contact and get the cartridge from the drive. Follows micro-move 7C.
7E	Log ID (no motion). Logs that picker is in position in front of drive, waiting for the drive to eject the cartridge.
7F	Plunge forward to get cartridge from the drive. Thumbs wrap over the ears on the cartridge.
80	Retract a small amount to take up the slack between the picker thumbs and the cartridge ears.
81	Retract plunge assembly fully back into the picker.
83	Flip during plunge when cartridge is in the top picker.
84	Flip during plunge when cartridge is in the bottom picker.
87	Short plunge out to test for a cartridge in the picker. If a cartridge is in the picker, the path clear beam will be interrupted. Used in an ISTAT.
88	Short plunge out to test for a cartridge in a magazine when the picker contains a cartridge. If resistance is felt, this is interpreted as a cartridge in the magazine. Used in an ISTAT.
89	Retract picker plunge assembly into the picker after executing micro-move 88. Used in an ISTAT.

Table 7: Micro-move IDs and expanded descriptions (Continued)

Micro-Move ID (hex)	Description
8A	Short plunge to test for a cartridge in a drive when the picker contains a cartridge. If resistance is felt, this is interpreted as a cartridge in the drive. Used in an ISTAT.
8B	Plunge out. Used in error recovery. Is an attempt to push a cartridge out of the vertical picker path and into a magazine.
8C	Retract thumbs back into the picker. Used in error recovery. Is an attempt to pull a cartridge out of the vertical picker path and into the picker. Either this micro-move or micro-move 8D is used, depending on position of the picker at the start of recovery.
8D	Retract thumbs back into the picker. Used in error recovery. Is an attempt to pull a cartridge out of the vertical picker path and into the picker. Either this micro-move or micro-move 8C is used, depending on the position of the picker at the start of recovery.
8E	Move picker plunge assembly out to rearm the picker mechanism before switching active picker.
8F	Retract picker plunge assembly to a point just short of tripping the thumb selection mechanism. First of two steps (second step is micro-move 90).
90	Retract picker fingers all the way back. Trips the mechanism that makes the opposite thumb "active."
91	Move picker plunge assembly forward, away from the full retracted position. Clears the tripping mechanism and makes the new thumb "active."
92 to 95	Factory use only. Does not run in normal operating code.
98 to 9F	Factory use only. Does not run in normal operating code.
A2	First of two plunge movements toward the drive during error recovery. Vertical movement is done before the second part of this movement (micro-move A3) is done.
A3	Second of two plunge movements toward the drive during error recovery. Done after a small vertical movement is done to "wiggle" the picker.
A4	Plunge out. Is an attempt to clear the vertical picker path during drive error recovery.
A5	Retract picker. Is an attempt to clear the vertical picker path during drive error recovery.
A5	First part of a two-step move to fully retract the picker plunge assembly. Retract assembly almost all the way back. Next part of move is micro-move A6.
A6	Second part of a two-step move to fully retract the picker plunge assembly. Continues movement of micro-move A5 and brings picker plunge assembly all the way back.
A7	Move picker plunge assembly forward a small amount from full retracted position. Completes rearm of the picker mechanism.
A8	Move to a position where the picker thumb sensor can be read. Used in the find plunge home recalibration.
A9	Move to a position where the current active picker can be read. Used in the plunge home recalibration.
AA	Fully retract picker plunge assembly to switch the active picker. One of three moves used to make the top picker the active picker during a picker recalibration.

Table 7: Micro-move IDs and expanded descriptions (Continued)

Micro-Move ID (hex)	Description
AB	Move picker plunge assembly forward a small amount to complete the rearm of the picker mechanism. One of three moves used to make the top picker the active picker during a picker recalibration.
AC	Move picker plunge assembly forward to normal position after a active picker has been change by micro-moves AA and AB. One of three moves used to make the top picker the active picker during a picker recalibration.
AD	Move the picker plunge assembly a small amount away from the flip mechanism so that the mechanism is rearmed for a flip. Used in a flip sequence.
AE	Move the picker plunge assembly out a small amount from the full retracted position to relieve the pressure on the mechanism after a flip.
AF	First of two moves to move the thumb to the magazine during an ISTAT when no cartridge is in the picker. Next move is micro-move B0.
B0	Second of two moves to move the thumb to the magazine during an ISTAT when no cartridge is in the picker. Slow move to check for an overforce (cartridge in the magazine slot).
B1	Retract picker plunge assembly back into the picker to a point where the thumbs can unsplay. Used during an ISTAT, with no cartridge in the picker, when the thumbs are splayed and are they must be unsplayed.
B2	Retract picker plunge assembly into the picker to a point just short of where the thumbs would be released and unsplay. Used during an ISTAT, with no cartridge in the picker, when the thumbs are splayed and must be kept splayed.
B3	Retract picker plunge assembly back far enough to release the thumbs and let them go to an unsplayed position. Used during an ISTAT, and the thumbs are being returned to an unsplayed position after contacting, grabbing, and replacing the first cartridge.
B4	Retract picker plunge assembly into the picker to a point just short of where the thumbs would be released and unsplay. Used during an ISTAT, and the thumbs are being retained in the splayed position after contacting, grabbing, and replacing the first cartridge.
B5	Retract picker plunge assembly far enough to get the thumbs out of the vertical picker path. Used during an ISTAT, no cartridge in the picker, and no cartridge was contacted in the first magazine.
B6	Pull picker plunge assembly fully back to rearm a "put." Enable the picker to replace the cartridge it picked up during an ISTAT.
B7	First of two moves that put a cartridge back into the magazine after the cartridge is detected during an ISTAT. Moves the cartridge almost fully into the magazine. Followed by micro-move B8.
B8	Second of two moves that put a cartridge back into the magazine after the cartridge is detected during an ISTAT. Moves the cartridge fully into the magazine.
B9	Second of two moves to test for the presence of a cartridge in a magazine during an ISTAT when there is a cartridge in the picker. Slow move to check for an overforce (cartridge in the magazine slot). Follows micro-move BA.
BA	First of two moves to test for the presence of a cartridge in a magazine during an ISTAT when there is a cartridge in the picker. Fast plunge that places the cartridge and the picker close to the magazine. Followed by micro-move B9.
BB	Testing for media in picker. After the physical force check.

Table 7: Micro-move IDs and expanded descriptions (Continued)

Micro-Move ID (hex)	Description
BC	Retract picker plunge assembly after detecting a cartridge in the drive. Used in an ISTAT when there is a cartridge in the picker.
BD	Retract picker plunge assembly to a point just short of where the thumbs would be released from their splayed position. Used if thumbs are splayed after checking magazines in an ISTAT.
BE	Retract picker plunge assembly after inserting a cartridge into a drive.
BF	Quickly retract the picker plunge assembly if an error occurred while inserting a cartridge into a drive.
C0	Retract picker plunge assembly to a point where the thumbs are released and go to an unsplayed position. Used in an ISTAT.
C1	Insert cartridge into a drive, just past the shutters. Distance has not been learned.
C2	Insert cartridge into a drive, just past the shutters. Distance has not been learned. Part one of a two-stage move. Used in the sequence to return a cartridge into a drive after an emergency eject during an ISTAT.
C3	Insert cartridge into a drive, just past the shutters. Distance has been learned. Part one of a two-stage move. Used in the sequence to return a cartridge into a drive after an emergency eject during an ISTAT.
C4	Insert cartridge fully into a drive. Distance HAS been learned. Part two of a two-stage move. Used in the sequence to return a cartridge into a drive after an emergency eject during an ISTAT.
C5	Insert cartridge fully into a drive. Distance HAS been learned. Additional push in case the drive acknowledge signal was not seen. Used in the sequence to return a cartridge into a drive after an emergency eject during an ISTAT.
C6	Insert cartridge fully into a drive. Distance HAS been learned. Part two of a two-stage move. Used in the sequence to return a cartridge into a drive after an emergency eject during an ISTAT.
C7	Retract picker to rearm position to splay the fingers. Used when an error in the drive acknowledge signal is seen and a drive eject will be done and the thumbs must be in the splayed position.
C8	Plunge thumbs out close to the end of the picker to get ready to “get” a cartridge. Done at the same time as vertical moves and in-transit translates and flips.
C9	Same as micro-move C8 but is a retry (if needed)
CB	Retract picker plunge assembly back far enough to clear the thumbs from the vertical picker path. Used after a cartridge is put in the mailslot.
CC	Plunge out to clear the mailslot path. Distance has not been learned. Used in error recovery.
CD	Short plunge out to fully seat a cartridge in the mailslot and to measure the distance of a fully-inserted cartridge.
CE	Plunge out to clear the mailslot path. Used in error recovery.
CF	Retract picker plunge assembly in an attempt to clear the mailslot path. Used in error recovery.
DO	Short plunge to push the cartridge to a fully seated position during a “get” to the mailslot. Distance is learned.

Table 7: Micro-move IDs and expanded descriptions (Continued)

Micro-Move ID (hex)	Description
D1	Short plunge during a mailslot "put." Ducks under the mailslot rotation mechanism and positions the picker so it can move up all the way to mailslot insertion position.
D2	Short plunge to put the cartridge all the way into the mailslot.
D3	Short plunge during a mailslot "get". Ducks under the mailslot rotation mechanism and positions the picker so it can move up all the way to the mailslot "get" position.
D4	Plunge to get the cartridge from the mailslot.
D5	Retract cartridge most of the way into the picker. Positions the picker so that it can duck under the mailslot rotation mechanism during a "get."
D6	Continue retraction in micro-move D5. Pull cartridge all the way back into the picker.
D7	Retract thumbs to a point just inside the picker. Used to clear the vertical picker path during error recovery.
D8	Plunge to a position where the mailslot rotation actuator can be pulled in.
D9	Plunge to a position where the mailslot rotation actuator can be pushed out.
DA	Move picker plunge assembly to a position where the mailslot rotation actuator can be engaged to rotate the mailslot out. Used when the state of the mailslot is unknown and must be placed in a known state.
DB	Retract the picker plunge assembly a short distance to clear the thumbs away from the mailslot after rotating the mailslot out.
DC	<p><i>For 1000ux/1900ux/2300ux models:</i> Slow retract of the picker plunge assembly, pulling the mailslot in. Checks that the cartridge is in properly. First move of a rotate in.</p> <p><i>For 3800ux/7100ux models:</i> Mailslot finished move in.</p>
DD	<p><i>For 1000ux/1900ux/2300ux models:</i> Retract thumbs back into the picker after rotating the mailslot out.</p> <p><i>For 3800ux/7100ux models:</i> Mailslot finished move out.</p>
DE	<p><i>For 1000ux/1900ux/2300ux models:</i> Plunge rotate mailslot 3 (not used).</p> <p><i>For 3800ux/7100ux models:</i> Mailslot pulled cartridge flush with front panel to check media present/media inserted correctly.</p>
DF	<p><i>For 1000ux/1900ux/2300ux models:</i> Plunge rotate mailslot 4 (not used).</p> <p><i>For 3800ux/7100ux models:</i> Mailslot starting a move in.</p>

Table 7: Micro-move IDs and expanded descriptions (Continued)

Micro-Move ID (hex)	Description
E0	<p><i>For 1000ux/1900ux/2300ux models:</i> Plunge rotate mailslot 5 (not used).</p> <p><i>For 3800ux/7100ux models:</i> Mailslot starting a move out.</p>
E1	<p><i>For 1000ux/1900ux/2300ux models:</i> First of two moves rotating the mailslot in. Quickly retract the picker plunge assembly, pulling the mailslot most of the way in. Followed by micro-move E3.</p> <p><i>For 3800ux/7100ux models:</i> Mailslot in the middle of a move in or move out.</p>
E2	<p><i>For 1000ux/1900ux/2300ux models:</i> Plunge out to rotate the mailslot almost all the way out.</p> <p><i>For 3800ux/7100ux models:</i> Mailslot approaching the end of a move in or move out.</p>
E3	<p><i>For 1000ux/1900ux/2300ux models:</i> Short retraction of the picker plunge assembly until pressure is felt. Used at end of rotating the mailslot in and ensures that the mailslot has been rotated fully in.</p> <p><i>For 3800ux/7100ux models:</i> Mailslot unexpected stop.</p>
E4	<p><i>For 1000ux/1900ux/2300ux models:</i> Short plunge out to relieve the pressure after rotating the mailslot in.</p> <p><i>For 3800ux/7100ux models:</i> Mailslot start initialization after an error or at startup.</p>
E5	<p><i>For 1000ux/1900ux/2300ux models:</i> Short plunge out, feeling for pressure, to ensure that the mailslot is rotated all the way out.</p> <p><i>For 3800ux/7100ux models:</i> Mailslot initialization successful.</p>
E6	<p><i>For 1000ux/1900ux/2300ux models:</i> Retract picker plunge assembly a short distance to relieve the pressure after micro-move E5.</p> <p><i>For 3800ux/7100ux models:</i> Mailslot end move with error -- move not complete.</p>
E7	On powerup, testing for motion in one direction on the plunge motor.

Table 7: Micro-move IDs and expanded descriptions (Continued)

Micro-Move ID (hex)	Description
E8	On powerup, testing for motion in the plunge motor. Opposite direction than in micro-move E7.
E9	Plunge out to clear the picker vertical path. Used when path is blocked during powerup.
EA	Picker plunge assembly retraction to clear the picker vertical path. Used when path is blocked during powerup.

Using HP StorageWorks Library and Tape Tools

HP StorageWorks Library and Tape Tools (L&TT) is a robust diagnostic tool for tape mechanisms, tape automation, magneto-optical and UDO products. L&TT provides functionality for firmware downloads, verification of device operation, maintenance procedures, failure analysis, corrective service actions and some utility functions. Seamless integration is provided with HP's hardware support organization through generating and emailing support tickets. The support ticket delivers a snapshot, or an in-depth view, of the storage system.

L&TT is a free download from the web and deploys in less than five minutes. It is ideal for customers who want ensured product reliability, self-diagnostics and faster resolution of device issues.

For more information, visit <http://www.hp.com/support/tapetools>.

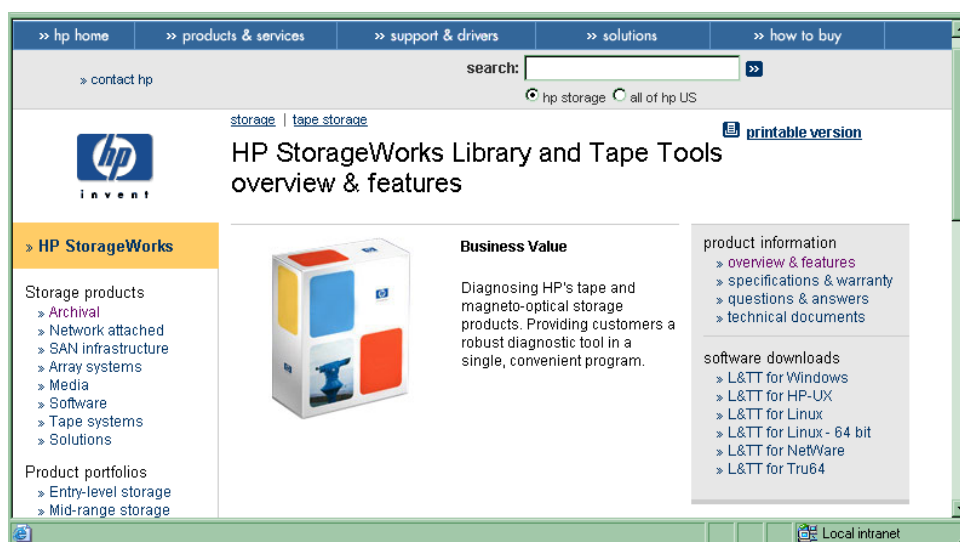


Figure 2: HP StorageWorks L&TT

Service Preparation

2

This chapter provides information on the following:

- [Protecting Yourself and the Product](#), page 44
- [Electrostatic Discharge \(ESD\) Precautions](#), page 44
- [Required Tools](#), page 44
- [Service Access](#), page 45
- [Identifying FRUs](#), page 47

Protecting Yourself and the Product



WARNING: *Do not disassemble the optical drive mechanism.* The optical drive mechanism becomes a Class 3B laser device when disassembled. If the drive is disassembled, exposure to the invisible laser beam and hazardous invisible laser radiation could result in blindness.

Note: An optical drive that has been disassembled will not be accepted as an exchange assembly.

Electrostatic Discharge (ESD) Precautions

The optical disk jukebox contains very sensitive electrical components. It is *extremely important* that you follow the proper procedures for preventing ESD (Electrostatic Discharge). Use wrist-grounding straps, anti-static mats, and anti-static work stations when removing and replacing the major assemblies.

Note: Failure to follow proper procedures could lead to intermittent failures and/or premature hard failures in the disk controller and mechanism.

Required Tools

The following tools are needed for assembly/disassembly of the jukebox:

- Pozidriv® magnetized screwdriver
 - flat-blade screwdriver
 - Needle-nose pliers
 - Flat-blade screwdriver
 - Torx® driver with the following bits: T-10, T-15, T20, and T25
-

Note: HP StorageWorks Library and Tape Tools is the tool to use when firmware upgrades are necessary. See [“Using HP StorageWorks Library and Tape Tools”](#) on page 42 for more information.

Service Access



Caution: Do not switch off power to the jukebox until you are sure the SCSI bus is *inactive*. Switching off the jukebox when the SCSI bus is active can cause data loss and/or indeterminate bus states.

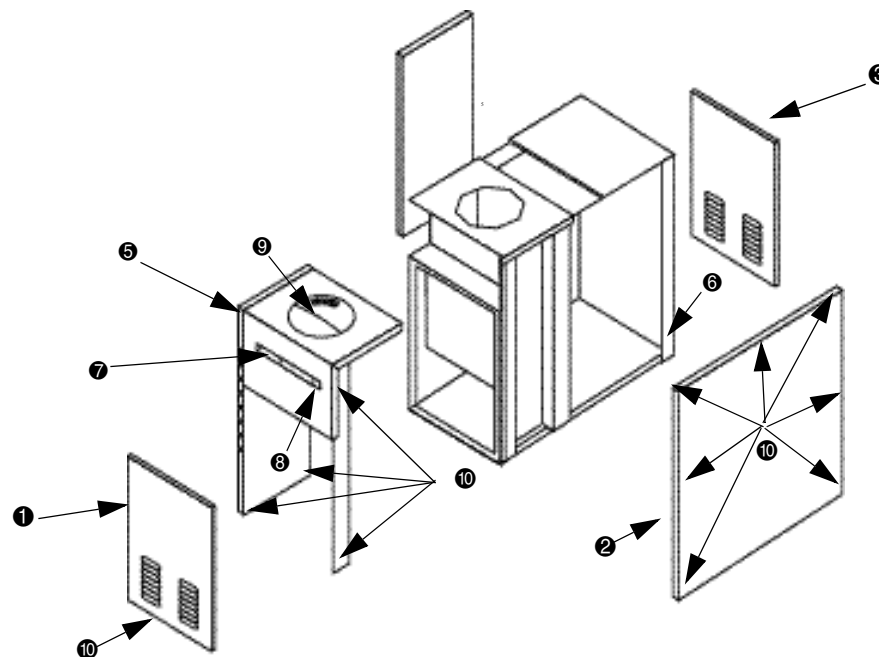


WARNING: To prevent possible electric shock, disconnect the power cord before taking the jukebox apart.



Caution: When servicing the jukebox, be sure that disk cartridges are not moved from their original slot locations. If you need to remove the cartridges, record their slot locations and orientation so they can be replaced to their original positions.

Access for 1000ux/1900ux/2300ux Models



- | | |
|-----------------------------|--------------------------------|
| ① Front access panel | ⑥ Power cord exits the jukebox |
| ② Right side access panel | ⑦ Mailslot |
| ③ Back access panel | ⑧ Power switch |
| ④ Left side access panel | ⑨ Control panel |
| ⑤ Left and top access panel | ⑩ Screws |

Figure 3: Access panel locations (for models 1000ux/1900ux/2300ux)

Access for 3800ux/7100ux Models

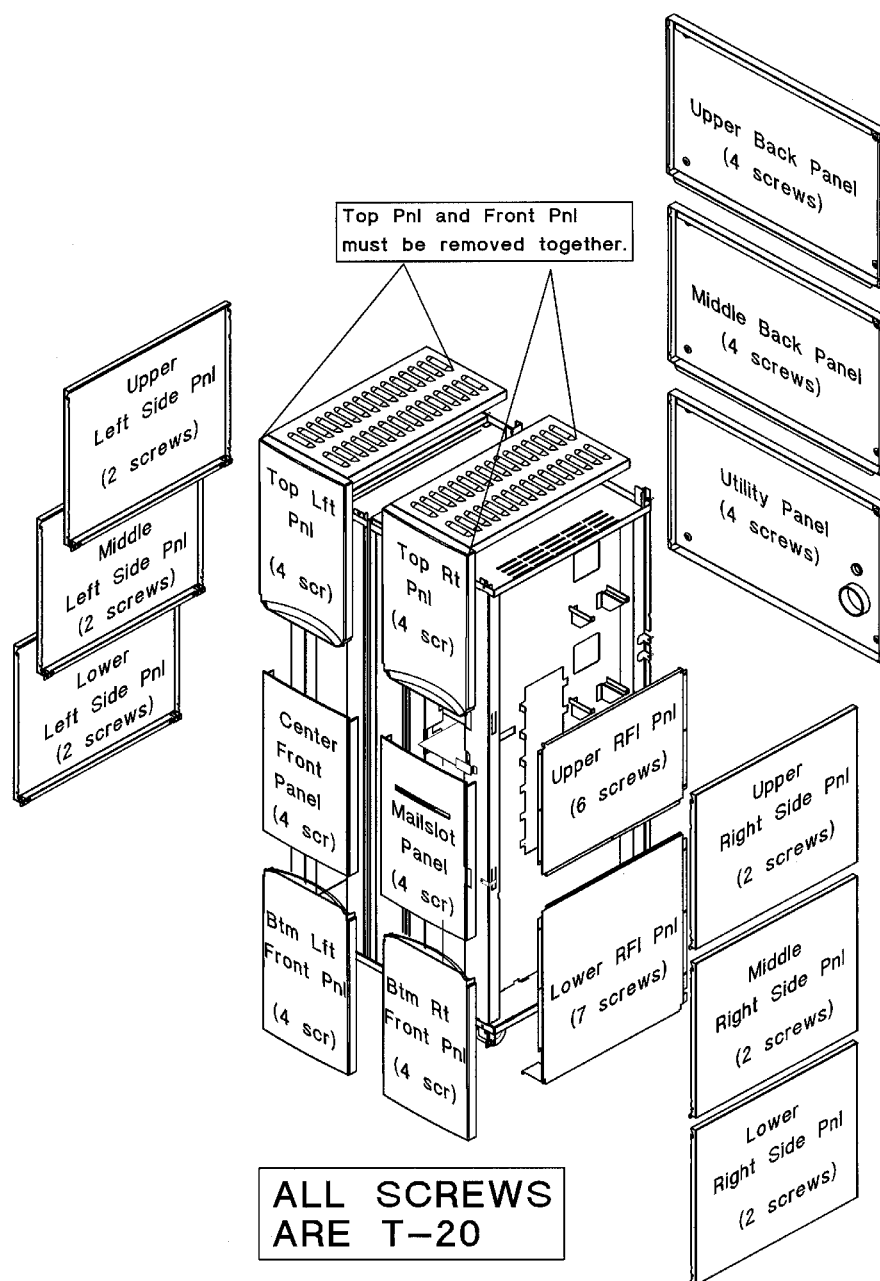


Figure 4: Access panel locations (for models 3800ux/7100ux)

Identifying FRUs

Note: The “x” in the part numbers listed in the following parts tables represents a number from “0” to “9” depending on the revision of the part. For example, if the part is newly released, the number will be “0”. The first time the part is revised, the number increments to “1”; the second time the part is revised, the number increments to “2”, and so on.

If you are unsure of the current part number, enter a "0" or a "1" in place of the "x" when checking your parts database and the current part number will display.

Identifying FRUs for 1000ux/1900ux/2300ux Models

Figure 5 through Figure 9 show exploded views of the FRUs for models 1000ux/1900ux/2300ux. Cross-reference Table 8 on page 57 for descriptions and part numbers for each FRU.

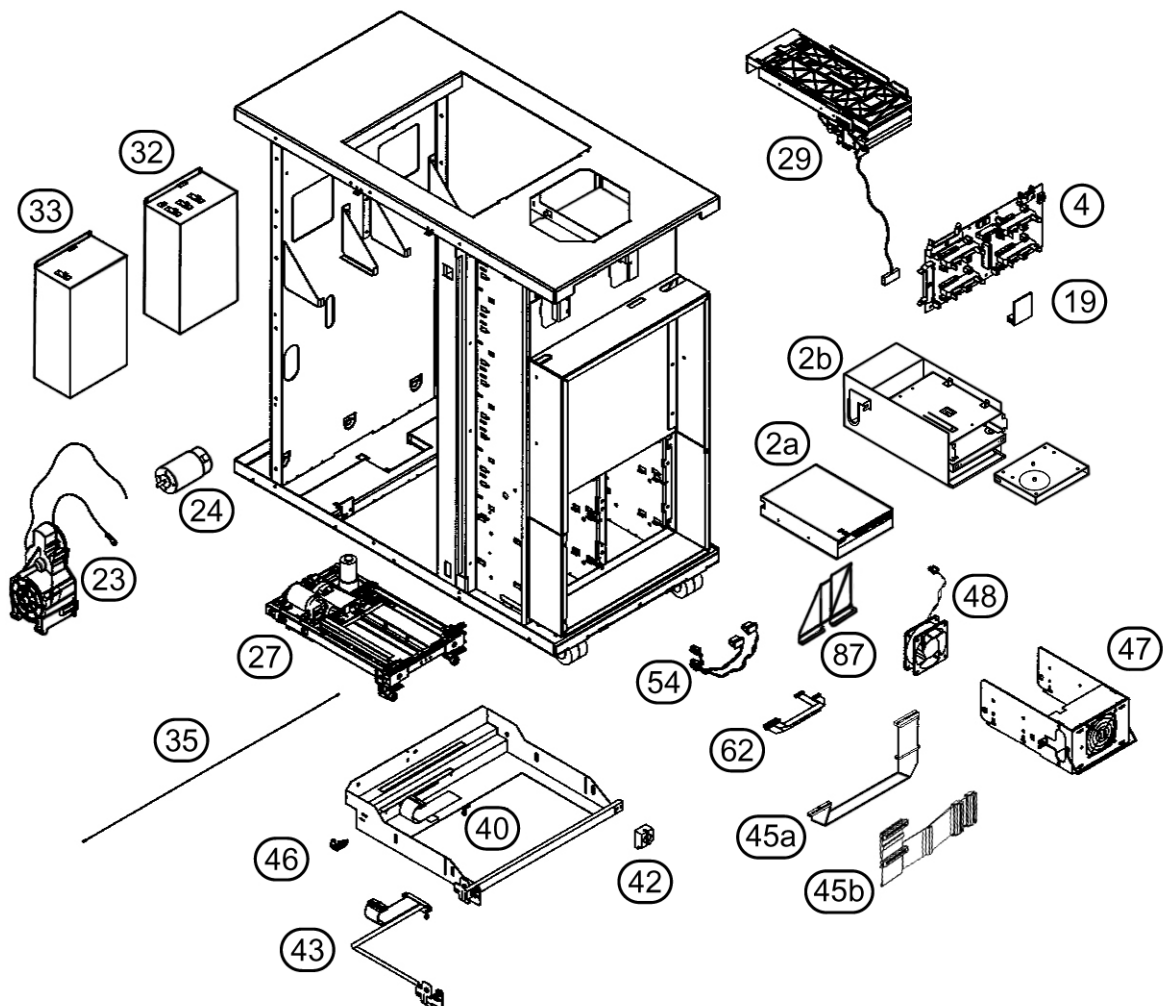


Figure 5: Exploded view for 1000ux/1900ux/2300ux models (1 of 3)

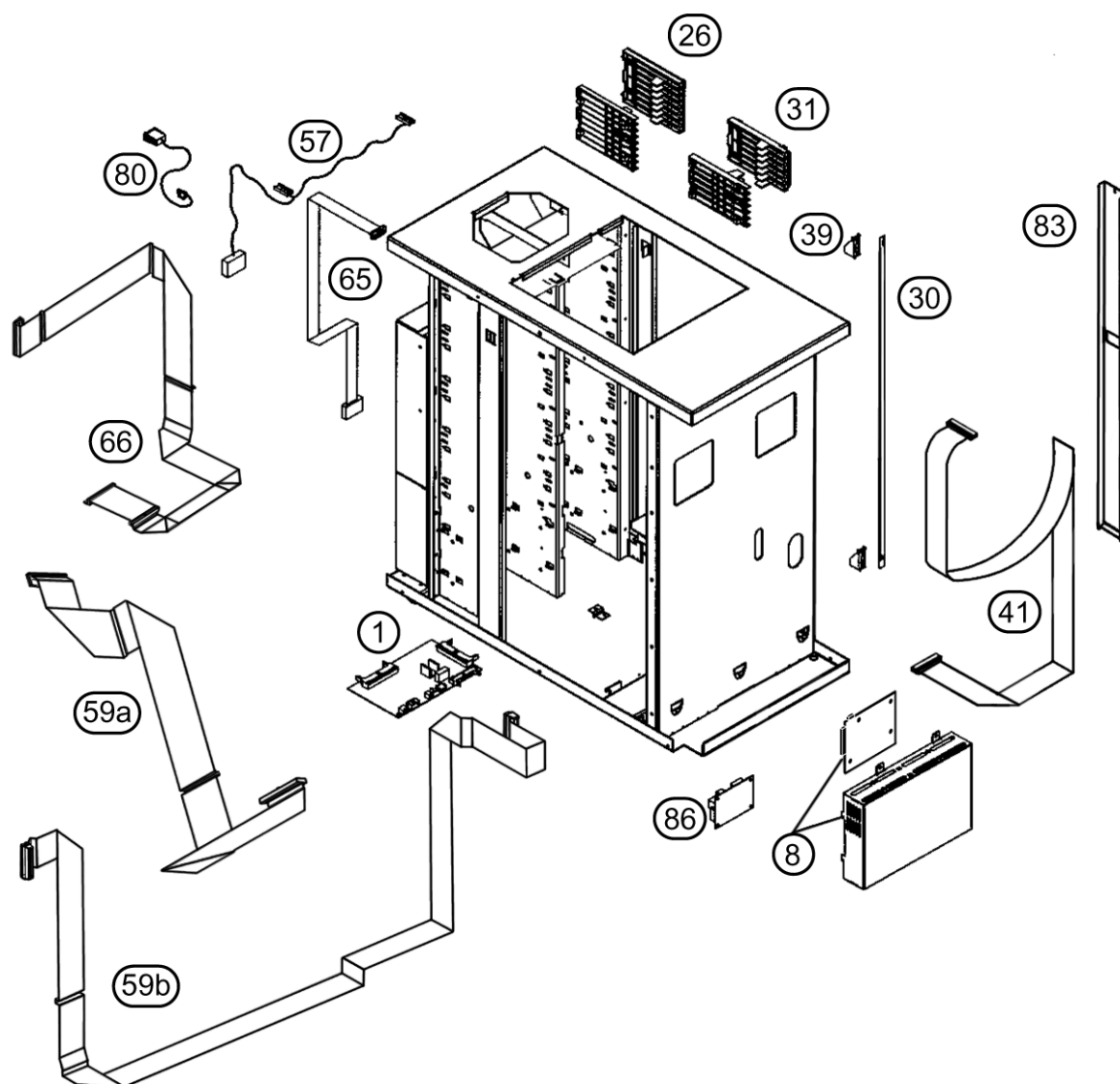


Figure 6: Exploded view for 1000ux/1900ux/2300ux models (2 of 3)

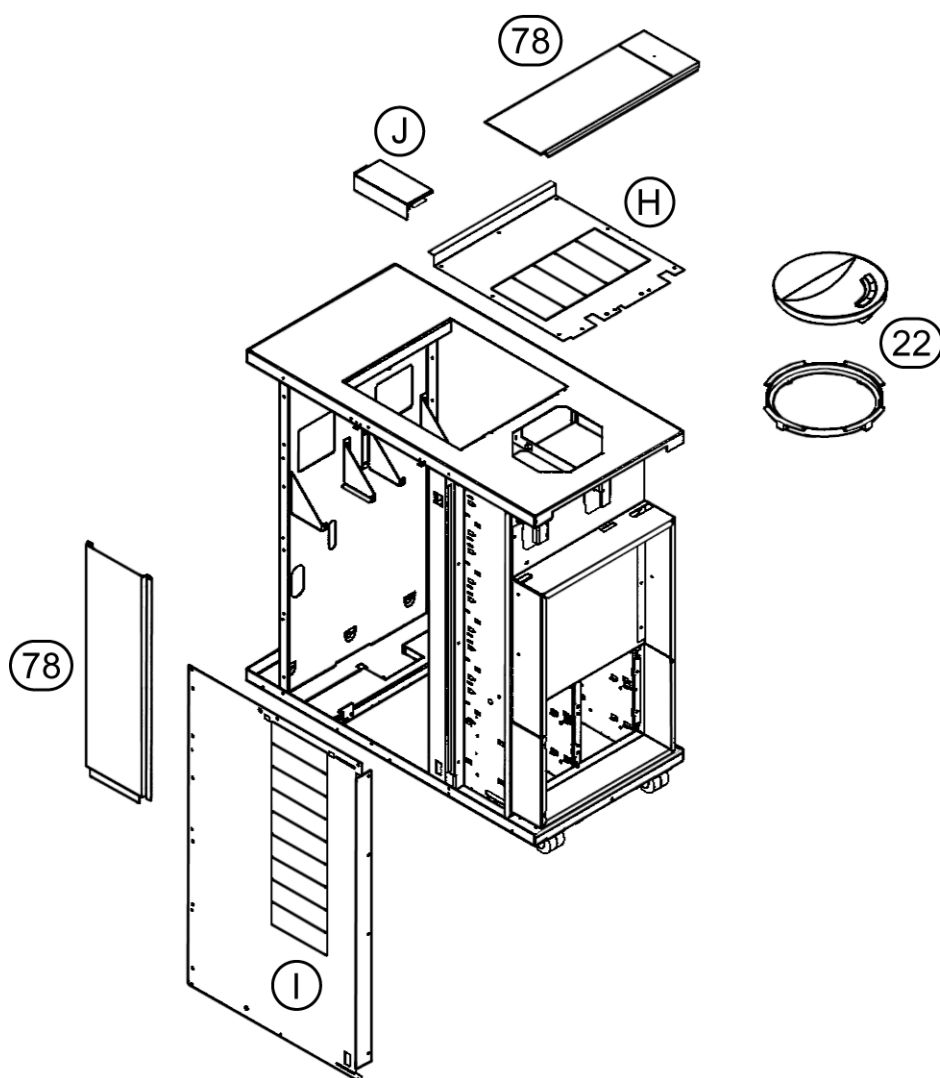


Figure 7: Exploded view for 1000ux/1900ux/2300ux models (3 of 3)

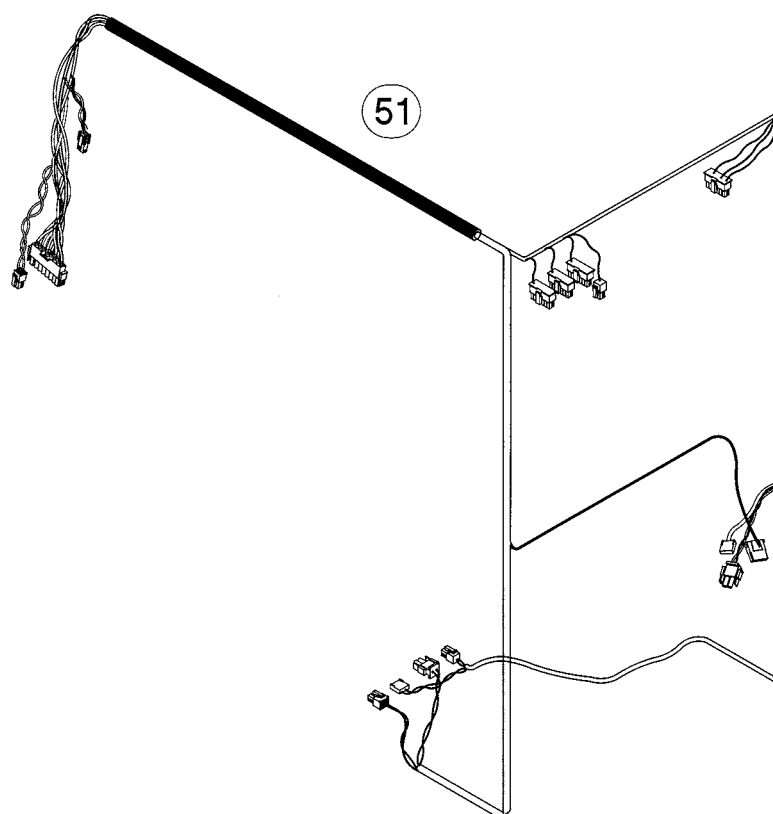


Figure 8: Power cabling for 1000ux/1900ux/2300ux models

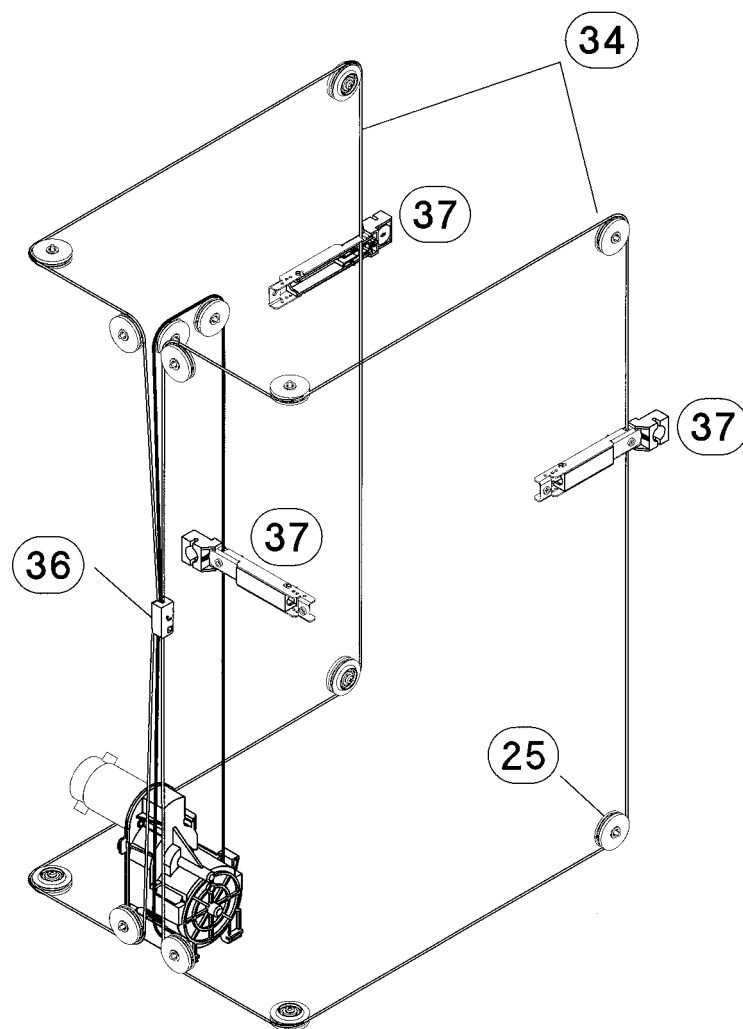


Figure 9: Rope and pulley system for 1000ux/1900ux/2300ux models

Identifying FRUs for 3800ux/7100ux Models

Figure 10 through Figure 15 show exploded views of the FRUs for models 3800ux/7100ux. Cross-reference Table 8 on page 57 for descriptions and part numbers for each FRU.

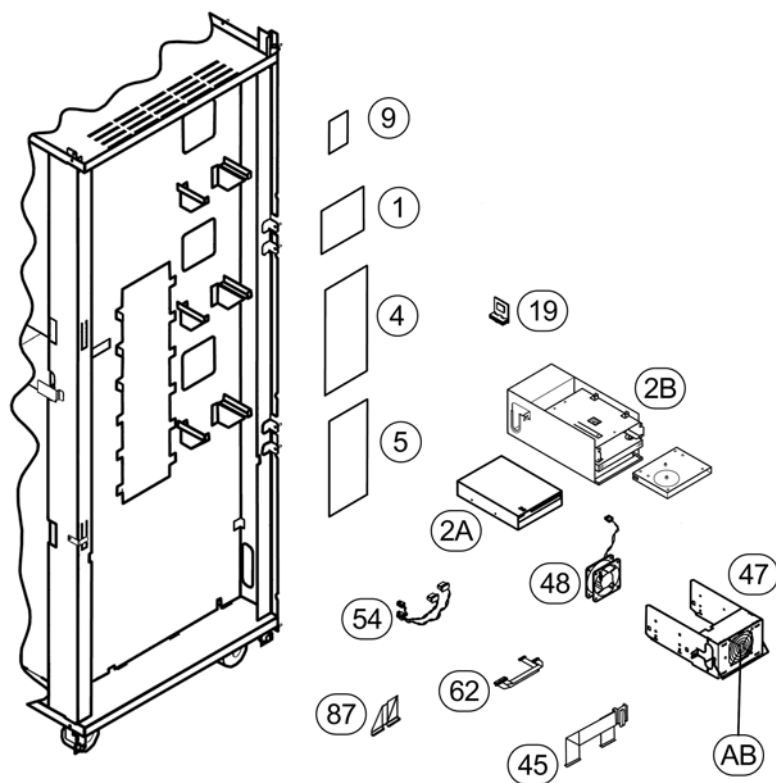


Figure 10: Exploded view for 3800ux/7100ux models (1 of 6)

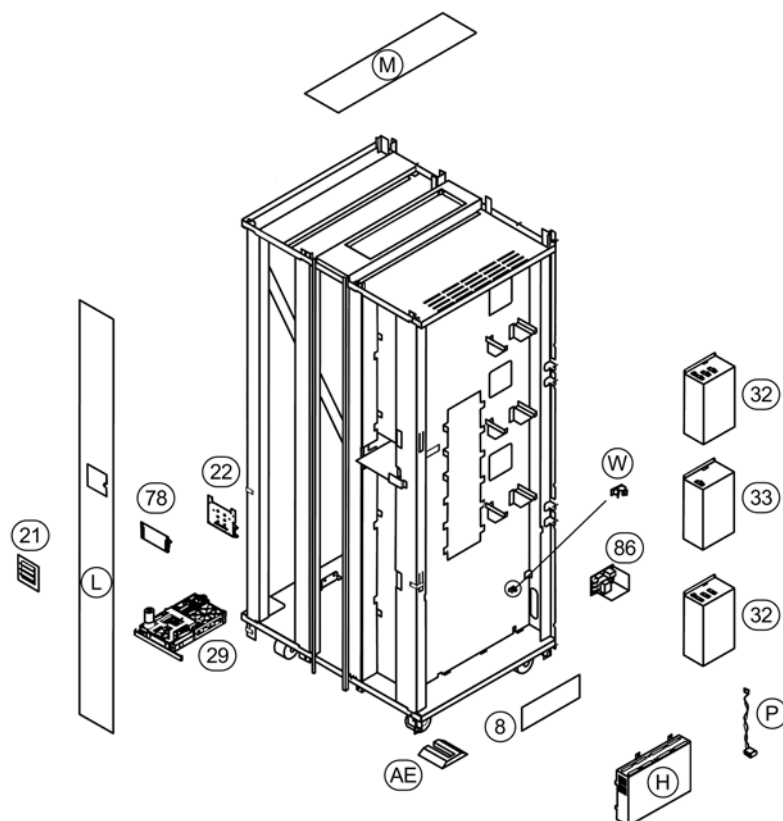
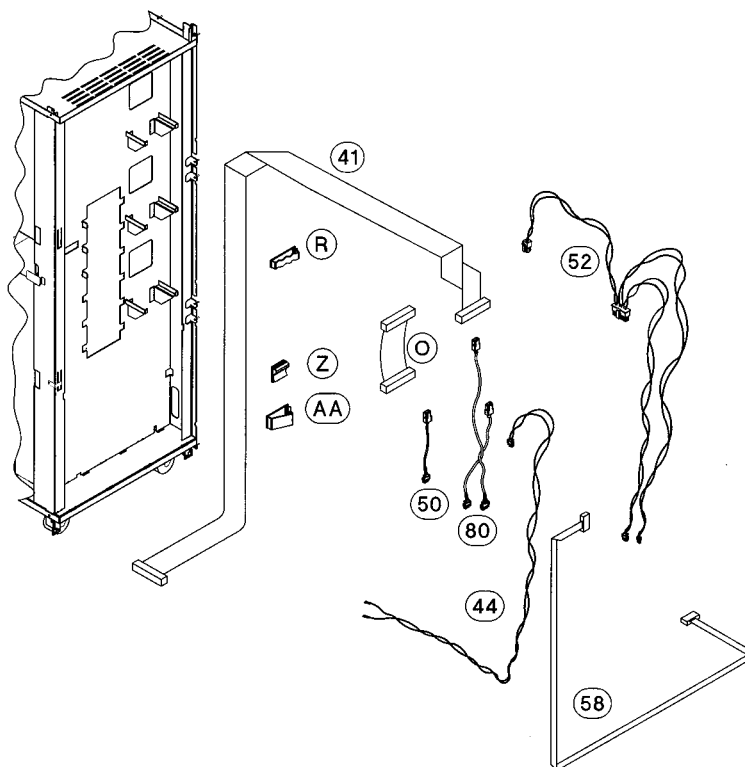


Figure 11: Exploded view for 3800ux/7100ux models (2 of 6)



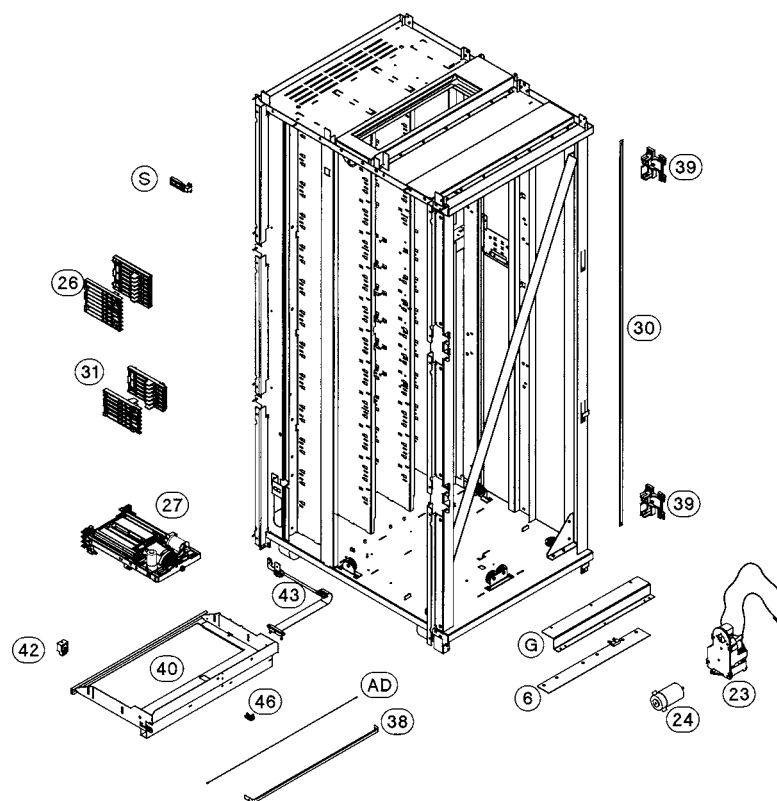


Figure 12: Exploded view for 3800ux/7100ux models (4 of 6)

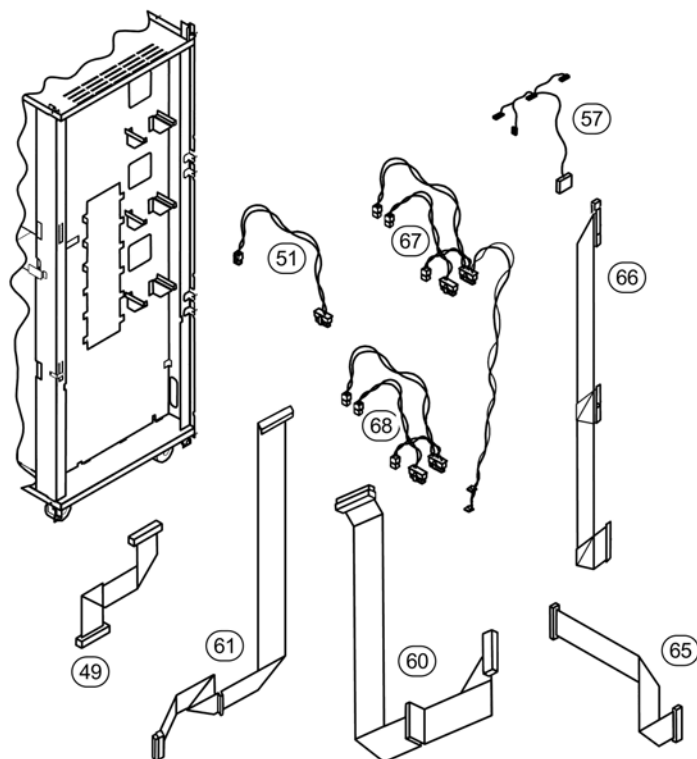


Figure 13: Exploded view for 3800ux/7100ux models (5 of 6)

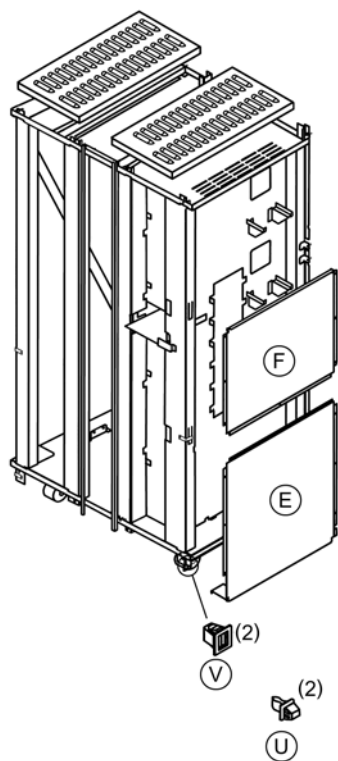


Figure 14: Exploded view for 3800ux/7100ux models (6 of 6)

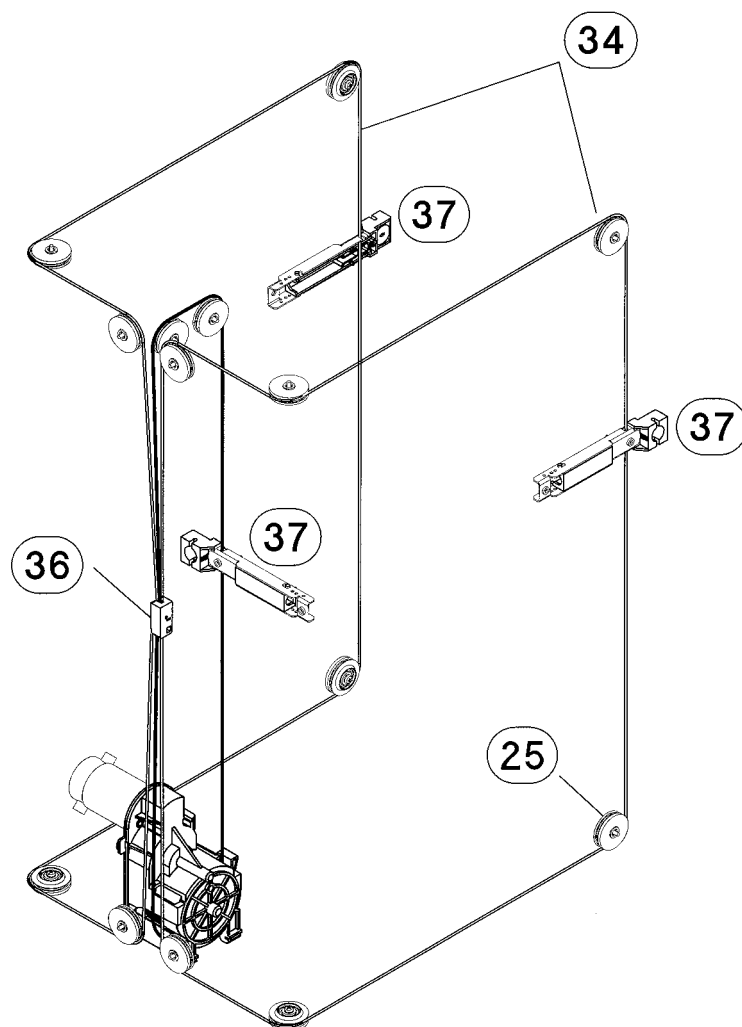


Figure 15: Ropes and pulley system for 3800ux/7100ux models

FRU Part Numbers for All Models

Note: FRU part numbers listed in Table 8 are common between all models unless otherwise noted.

Note: For the latest information on FRU part numbers, visit <http://partpage.corp.hp.com>.

Note: Some part numbers include an “x” which represents a number from “0” to “9”, depending on the revision of the part. For example, if the part is newly released, the number will be 0”. The first time the part is revised, the number increments to “1”; the second time the part is revised, the number increments to “2”, and so on.

If you are not sure of the current part number, enter a “0” or a “1” in place of the “x” when checking your parts database, and the current part number will display.

Part numbers ending in “-x9xxx” designate that the FRUs have been remanufactured.

Table 8: FRU Assemblies

FRU No.	Jukebox Models	Part Number	Description
1	1000ux/1900ux/2300ux 3800ux/7100ux	C1153-60x01 C1104-60x01	robotics controller PCA
2a	All	C1113-60x14 C1113-69x14 AA961-67001 AA961-69001	optical drive mechanism, 9.1-Gb UDO drive mechanism, 30-Gb
2b	All	AA968-67003	media detect station
4	1000ux/1900ux/2300ux 3800ux/7100ux	AA965-67001 AA965-69001 AA969-67002 AA969-69002	interposer PCA upper interposer PCA
5	3800ux/7100ux	AA969-67003 AA969-69003	lower interposer PCA
6	3800ux/7100ux	C1107-60x06	vertical-path-clear PCA
8	All	AA965-67002 AA965-69002	buffer board
19	1000ux/1900ux/2300ux 3800ux/7100ux	C1170-60x03 C1170-69x03 C1110-60x03 C1110-69x03	configuration module
22	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x22 C1107-60x22	display assembly

Table 8: FRU Assemblies (Continued)

FRU No.	Jukebox Models	Part Number	Description
23	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x23 C1107-60x23	vertical motor gearbox assembly
24	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x24 C1107-60x24	vertical motion motor
25	All	C1160-60x25	idler pulley kit
26	All	C1100-60x26	magazine (pair) 8-slots
27	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x27 C1107-60x27	dual-cartridge picker picker/guide assembly
29	1000ux/1900ux/2300ux 3800ux/7100ux	C1100-60x29 C1107-60x29	mailslot assembly
30	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x30 C1107-60x30	encoder strip vertical encoder strip
31	All	C1160-60x26	magazine (pair) 6-slots
32	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x28 C1107-60x28	power supply (200w, 5/12v)
33	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x33 C1107-60x33	power supply (120w, 24v) power supply (160w, 24/42v)
34	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x34 C1107-60x34	slave rope
35	1000ux/1900ux/2300ux	C1160-60x35	translate rope
36	All	C1160-60x36	coupler assembly
37	All	C1160-60x37	tensioner assembly
38	3800ux/7100ux	C1107-60x38	translate encoder strip
39	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x39 C1107-60x39	encoder mount
40	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x40 C1107-60x40	translate frame
41	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x41 C1107-60x41	vertical umbilical cable
42	All	C1160-60x42	mount guide - slider
43	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x43 C1107-60x43	translate umbilical cable
44	3800ux/7100ux	C1107-60x44	vertical motor power cable
45a 45b 45	1000ux/1900ux/2300ux 3800ux/7100ux	AA965-67003 AA968-67001 AA969-67005 AA974-67001	SCSI drive can cable MO drive(s) to interposer cable UDO drive to interposer cable MO drive to interposer cable
46	All	C1160-60x46	capture roller assembly
47	1000ux/1900ux/2300ux 3800ux/7100ux	C1170-60x47 C1107-60x47	drive enclosure drive bracket assembly

Table 8: FRU Assemblies (Continued)

FRU No.	Jukebox Models	Part Number	Description
48	All	C1160-60x48	drive fan
49	3800ux/7100ux	C1107-60x49	SCSI cable (top interposer PCA to controller PCA)
50	3800ux/7100ux	C1107-60x50	lower 5/12v power supply AC input cable
51	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x51 C1107-60x51	main power harness logic power cable
52	3800ux/7100ux	C1107-60x52	motor power cable
54	1000ux/1900ux/2300ux 3800ux/7100ux	C1170-60x54 C1107-60x55	drive power cable (1 per 2 drives in enclosure)
57	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x57 C1107-60x57	vertical path-clear sensor cable
58	3800ux/7100ux	C1107-60x58	vertical path-clear receiver cable
59a 59b	1000ux/1900ux/2300ux	AA965-67005 AA965-67006	interposer cable buffer to interposer cable
60	3800ux/7100ux	AA969-67006	buffer to lower interposer cable
61	3800ux/7100ux	AA969-67007	buffer to upper interposer cable
62	1000ux/1900ux/2300ux 3800ux/7100ux	AA965-67004 AA968-67002 AA969-67008 AA974-67002	UDO drive ACI cable MO drive ACI cable UDO drive ACI cable MO drive ACI cable
65	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x65 C1107-60x65	control panel cable
66	1000ux/1900ux/2300ux 3800ux/7100ux	AA965-67007 AA969-67001	SCSI controller cable GPIO cable
67	3800ux/7100ux	C1107-60x67	upper drives power cable
68	3800ux/7100ux	C1107-60x68	lower drives power cable
78	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x78 C1107-60x78	display window assembly
80	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x80 C1107-60x80	AC power cord assembly
86	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-60x86 C1107-60x86	AC distribution PCA
87	1000ux/1900ux/2300ux 3800ux/7100ux	AA965-67008 AA969-67009	SCSI jumper cable
F	3800ux/7100ux	C1107-60x93	upper RFI shield
G	3800ux/7100ux	C1107-60x92	vertical path-clear cover
H	1000ux/1900ux/2300ux 3800ux/7100ux	C1160-00606 C1107-60x81	panel - top, RFI SCSI interface enclosure
I	1000ux/1900ux/2300ux	C1160-00607	panel - side, RFI
J	1000ux/1900ux/2300ux	C1160-00608	cover, corner

Table 8: FRU Assemblies (Continued)

FRU No.	Jukebox Models	Part Number	Description
L	3800ux/7100ux	C1107-60x87	front window
M	3800ux/7100ux	C1107-60x85	top window
O	3800ux/7100ux	C1107-60x42	umbilical jumper cable
P	3800ux/7100ux	C1160-60x80	power switch cable
R	3800ux/7100ux	1400-2124	clamp for vertical umbilical cable
S	3800ux/7100ux	C1700-41202	vertical sensor bracket
U	3800ux/7100ux	1390-1040	strike (used when replacing lower side panel -- order two)
V	3800ux/7100ux	1390-1041	latch (used with strike (U) -- order two)
W	3800ux/7100ux	1400-2124	round, ratchet latch cable clamp (used for input AC power cord)
Z	3800ux/7100ux	1400-0611	clip-style cable clamp (holds long interposer cable)
AA	3800ux/7100ux	1400-1611	latch-style cable clamp (used for power cable routing and other purposes)
AB	3800ux/7100ux	3160-0214	drive fan grille
AD	3800ux/7100ux	C1107-60035	translate rope
AE	3800ux/7100ux	4320-0448	wheel chocks
(not shown)	All	5183-2657	LVDS/SE terminator
(not shown)	All	1200-1997	LVDS/SE converter module
(not shown)	All	Q2030-60010 Q2031-60010	30-Gb WORM media 30-Gb rewritable media
(not shown)	1000ux/1900ux/2300ux	C1160-60199	packaging kit (for reshipment)
(not shown)	1000ux/1900ux/2300ux	1400-0514	flat RFI cable clamp
(not shown)	1000ux/1900ux/2300ux	C1160-80602	EMI gasket

FRU Removal and Replacement

3

This chapter provides information on the following:

- [FRU Removal and Replacement for 1000ux/1900ux/2300ux Models](#), page 62
- [FRU Removal and Replacement for 3800ux/7100ux Models](#), page 94

FRU Removal and Replacement for 1000ux/1900ux/2300ux Models

The following procedures describe removal and replacement procedures for 3800ux/7100ux jukebox FRUs.

- [Replacing a Power Supply](#), page 63
- [Replacing the Mailslot Assembly](#), page 64
- [Replacing the Control Panel Assembly](#), page 65
- [Replacing an Optical Drive — Jukebox Offline](#), page 66
- [Replacing a Media Detect Station](#), page 69
- [Replacing the Interposer PCA](#), page 71
- [Replacing the Picker](#), page 72
- [Removing/Replacing the Translate Frame \(Including the Picker\)](#), page 77
- [Removing/Replacing the Vertical Encoder Strip](#), page 83
- [Replacing the Vertical Motion Motor](#), page 84
- [Replacing the Vertical Motor Gear Box](#), page 85
- [Replacing the Controller PCA](#), page 88
- [Replacing the Buffer Assembly](#), page 90
- [Replacing the SCSI Cable](#), page 91
- [Checking the RFI Adjustments](#), page 92

Replacing a Power Supply

1. Remove the right access panel (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Remove the power plug from the bottom of the power supply (see #1 on [Figure 16](#)).
3. Disconnect the cables from the top of the supply (see [Figure 16](#)).
The 5V/12V supply has four cables (#2); the 24V supply has one cable (#3).
4. Remove the two T-20 screws at the top of the supply (see arrows on top of power supplies in [Figure 16](#)).
5. Lift the supply up and out.

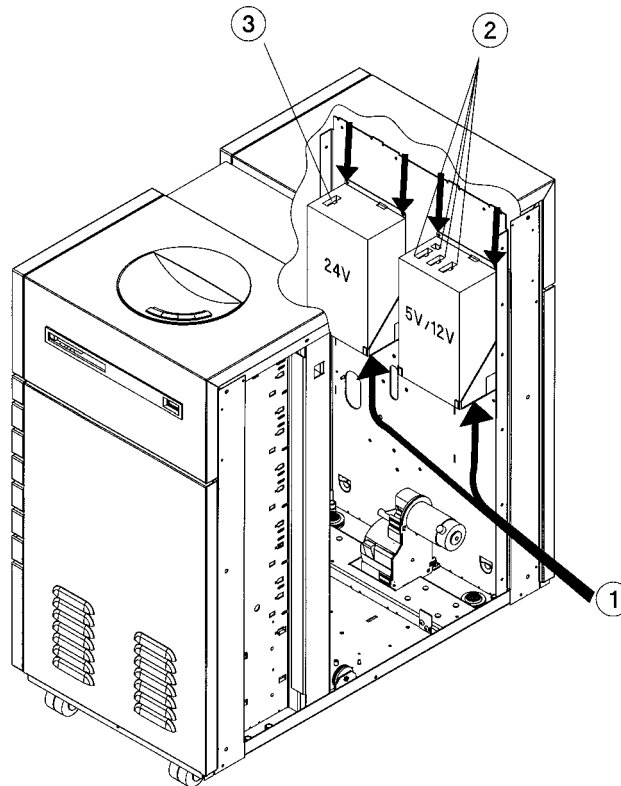


Figure 16: Cables and Mounting Screws on the Power Supplies

Replacing the Mailslot Assembly

1. Remove the front panel (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Remove the two T-15 mailslot mounting screws from the upper left side of the chassis (see arrows on the left side of [Figure 17](#)).

These screws are recessed. Use a Torx driver with an extended shaft.

3. Unplug the mailslot cable from the interposer PCA.
4. Slide the mailslot out of the jukebox.

Thread the mailslot cable through the slot as you pull the mailslot out of the chassis (see [Figure 17](#)).

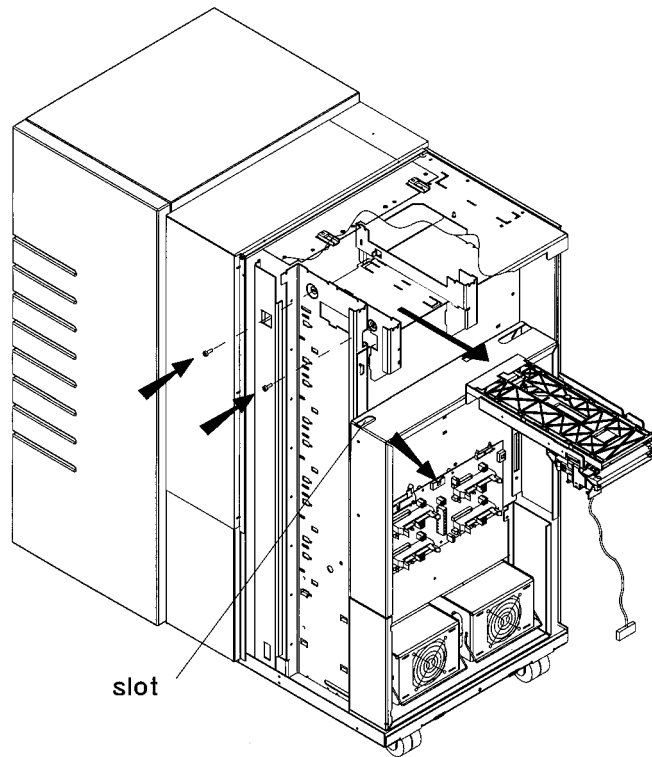


Figure 17: Mailslot Assembly Mounting Screws

Reassembly Notes

Thread the mailslot cable down through the slot on the top of the PCA enclosure while inserting the mailslot into the chassis. After mailslot is installed, connect the mailslot cable to the interposer PCA.

Replacing the Control Panel Assembly

1. Remove the front panel (see “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Turn the panel upside down.
3. Remove the four T-10 sheet metal screws from the control PCA retaining ring to detach the control panel PCA from the mounting assembly (see the arrows on [Figure 18](#)).
4. Remove the control panel.

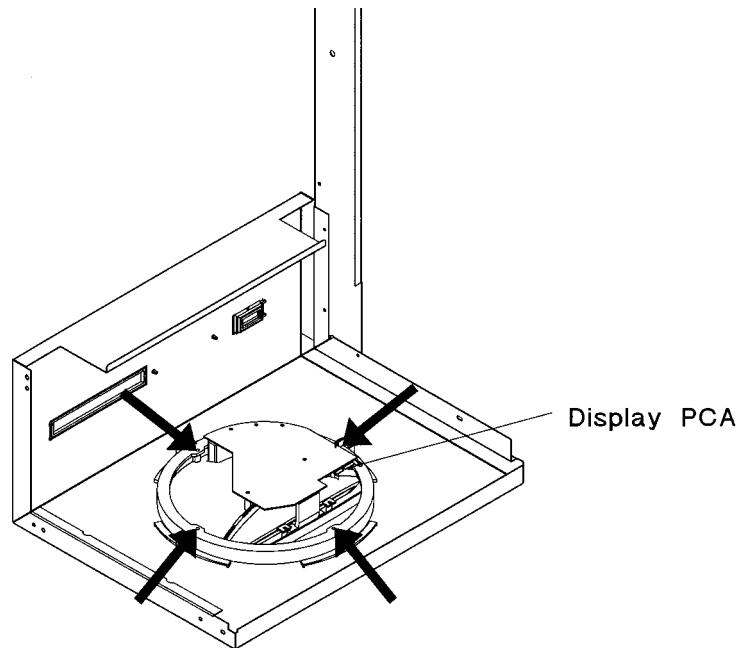


Figure 18: Control Panel Assembly Mounting Screws

Reassembly Notes

When replacing the right front panel back onto the chassis, ensure that the control panel is turned to face the same way as when the panel was removed. The control panel PCA can be damaged if oriented incorrectly.

Replacing an Optical Drive — Jukebox Offline

Note: Before replacing a drive, obtain the most current version of the jukebox controller and drive firmware for the model and option of the jukebox you are servicing.

Note: Online drive repair is not supported for 1000ux/1900ux/2300ux models.

1. Remove the back panel (see “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Remove the drive cables for the failed drive from the interposer PCA. The cable group for drive 1 is shown on [Figure 19](#):
3. Remove the T-20 enclosure mounting screw on the enclosure holding the failed drive. The mounting screws for both drives are shown in [Figure 19](#)).

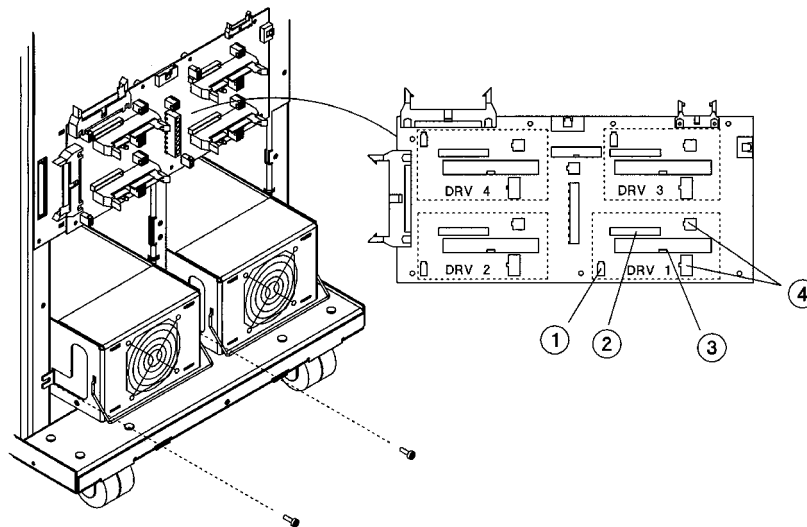


Figure 19: Removing Drive Cables and Enclosure Mounting Screw

4. Carefully slide the drive enclosure back and out of the chassis. Avoid catching the enclosure on cables connected to the other drive enclosures.

5. Remove the T-10 screws that hold the small cable access panel on the top of the drive enclosure. Remove the panel (see [Figure 20](#)).

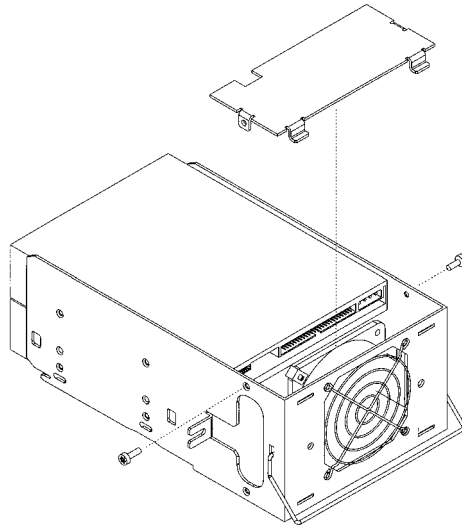


Figure 20: Unmounting a Drive From An Enclosure

6. Disconnect the drive cables from the rear of the drive.
 - drive interface cable
 - SCSI cable
 - drive power cable
7. Remove the four T-10 screws that hold the drive in the drive enclosure and slide the drive out of the enclosure.

8. *If there is a disk in the drive*, use a disk eject tool to remove the disk from the drive.
 - a. Insert a small screwdriver or paper clip into the disk eject access hole (see [Figure 21](#)).
 - b. When you feel firm pressure on the tip, push forward. The disk mechanism will eject the disk.

Note: Remember whether the “A” or “B” side faces up when you remove the disk. The disk must be inserted into the replacement drive with the same orientation.

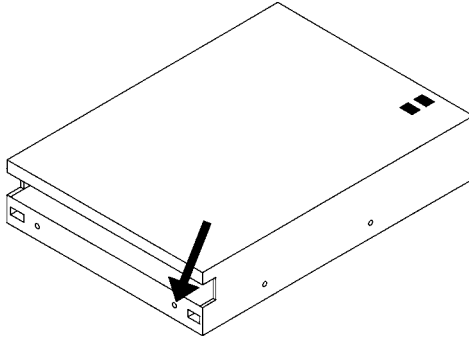


Figure 21: Disk Eject Hole

9. Slide the replacement drive into the enclosure nearly all the way. Leave room to connect the drive cables to the rear of the drive.
10. Connect the drive power cable, SCSI cable, and drive interface cable to the rear of the drive.

While placing the drive interface cable onto the drive, slip the plastic cable guide around the interface cable, remove the adhesive backing, and stick the guide to the rear of the drive.
11. Insert and tighten the four T-10 screws that mount the drive into the enclosure.
12. Remount the cable access panel on top of the enclosure with two T-10 screws (see [Figure 20](#))
13. If a disk was removed from the failed drive, replace the disk into the drive in the same orientation.
14. Insert the drive enclosure into the chassis and secure the enclosure with a T-20 screw (see [Figure 19](#)).
15. Connect all drive cables to the interposer PCA:
 - #1 - drive enclosure fan power
 - #2 - drive interface cable
 - #3 - SCSI cable
 - #4 - drive power cable (two connections)

Replacing a Media Detect Station

1. Remove the left access panel (the panel below the mailslot). See “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45.
2. Remove all drive cables for the drive enclosure that contains the media detect station.

Note: Take note of cable connections for easier reattachment.

3. Remove the drive enclosure from the chassis.
4. Remove the four T-10 screws holding the top and bottom access plates on the drive enclosure (see #1 and #2 in [Figure 20](#)). Remove the plates.
5. Remove the four T-10 screws that hold the drive in the drive enclosure and slide the drive forward a small amount to give you room to remove the cables.
6. Remove the media detect station:
 - a. Remove the T-15 screw securing the media detect station sleeve (black plastic) to the sheet metal support.
 - b. Slide the sleeve off of the sheet metal support.
 - c. Unmount the media detect station support (gray sheet metal) from the inside of the drive module by removing four T-10 screws.
7. Install the new media detect station (see [Figure 22](#)):
 - a. Mount the media detect station support (gray sheet metal) to the inside of the drive module using four T-10 screws.
 - b. Slide the media detect station sleeve (black plastic) into the sheet metal support, and secure it using a T-15 screw.



Caution: To avoid damaging optical media and subsequent data loss, ensure that the screw does not project into the surface of the plastic on the media detect station.

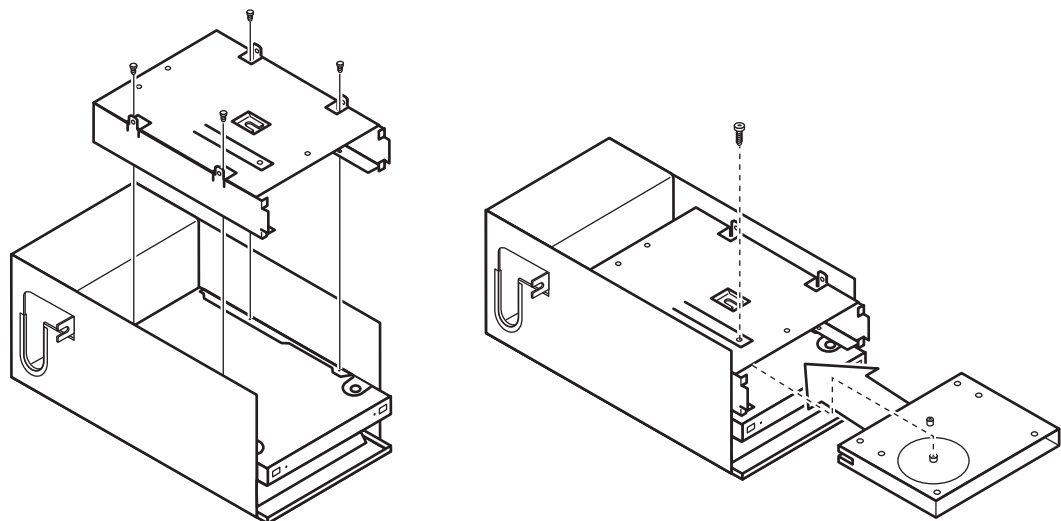


Figure 22: Reinstalling a media detect station

8. Reattach the four T-10 screws that hold the drive in the drive enclosure, and reattach the cables removed in step 4.
9. Reattach the four T-10 screws holding the top and bottom access plates on the drive enclosure.
10. Reinstall the drive enclosure into the chassis.
11. Reattach the drive cables removed in step 2.
12. Reattach the back panel removed in step 1.

Replacing the Interposer PCA

1. Remove the front access panel (see “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Disconnect all cables to the interposer PCA (see [Figure 23](#)).
3. Remove the eight T-20 screws holding the PCA to the chassis.

Note: CHECK TO SEE IF THERE IS A CONFIGURATION MODULE MOUNTED ON THE PCA. IF A CONFIGURATION MODULE IS INSTALLED, TRANSFER THE MODULE TO THE REPLACEMENT PCA.

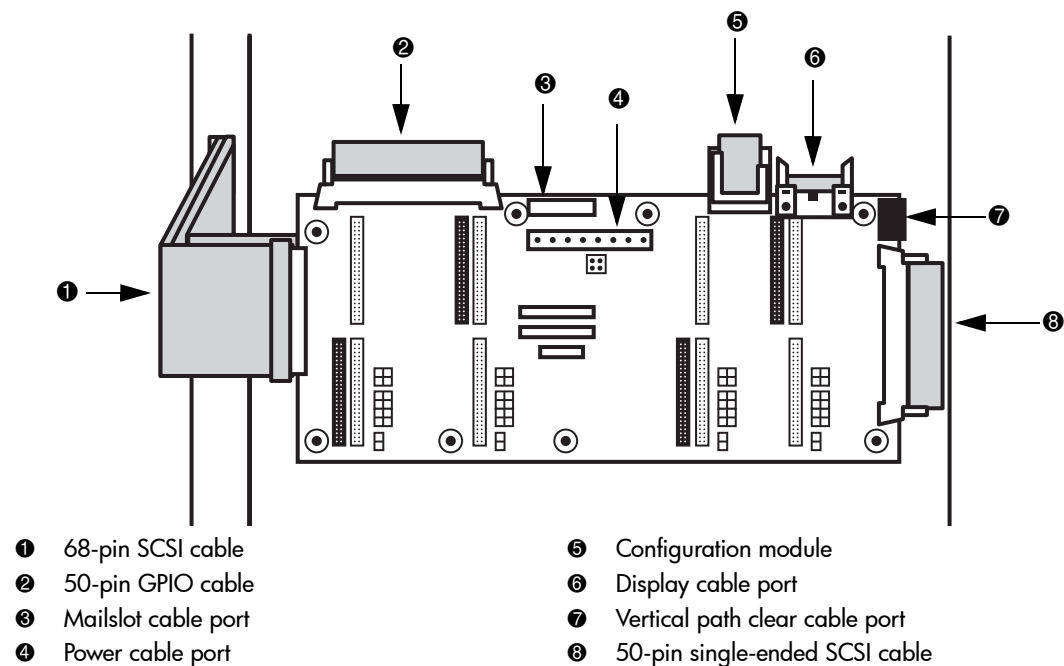


Figure 23: Disconnecting interposer cables and removing screws

4. To install the replacement interposer PCA, follow steps 1 through 3 in reverse order.

Replacing the Picker

1. Remove the left access panel (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Pull the tab on the end of the picker umbilical cable to disconnect the cable from the bottom of the picker (see [Figure 24](#)).

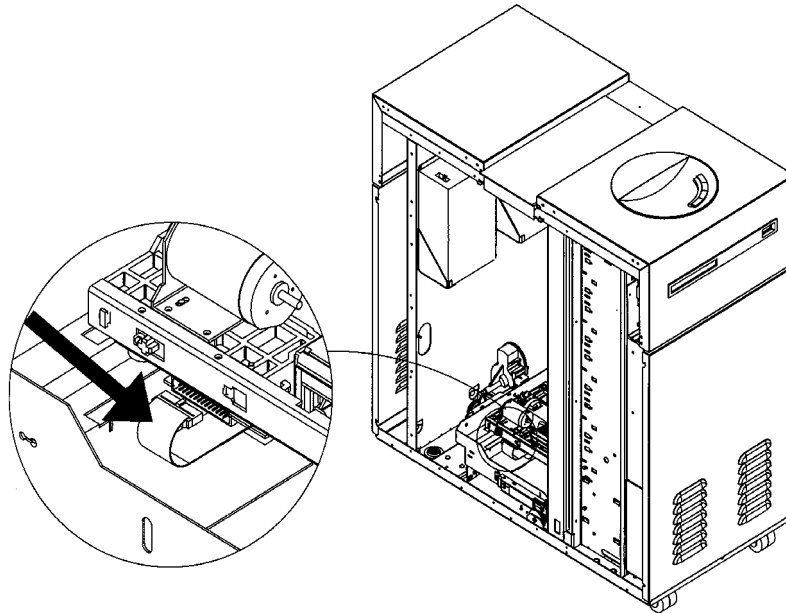


Figure 24: Picker Umbilical Cable

3. Release the translate cable from the side of the translate frame nearest the front of the jukebox (see [Figure 25](#)):
 - a. Depress the tension spring (#1) on the side of the translate frame to release the tension on the cable and allow you to pass the cable up through the slotted hole (#2).
 - b. Slide the cable into the pinch slot on the side of the picker (#3). Placing the cable in the pinch slot prevents the cable from unraveling from the central picker hub.

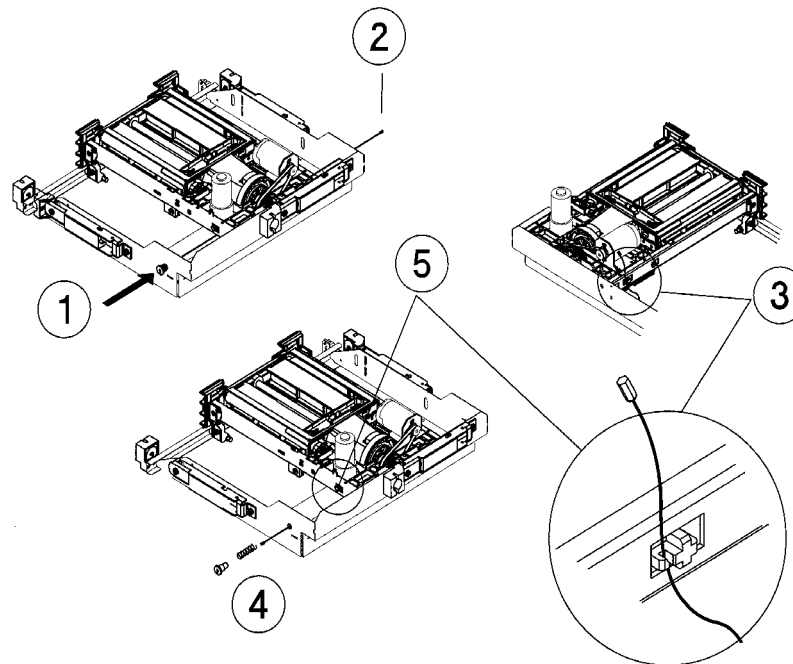


Figure 25: Releasing and Stowing the Picker Translate Cable

4. Release the translate cable from the side of the translate frame nearest the rear of the jukebox (see [Figure 25](#)):
 - a. Remove the spring and slotted plug that holds the translate cable (#4). The cable passes through a hole in the side of the frame and into a slotted plug with a tensioner spring. Remove the spring and slotted plug.
 - b. Slide the cable into the pinch slot on the side of the picker (#5). Placing the cable in the pinch slot prevents the cable from unraveling from the central picker hub.



Caution: Raise the translate frame only by pulling on the vertical drive rope (see top arrow in [Figure 26](#)). The frame can be twisted by pulling it by the sides. A twisted frame may cause various errors in operation.

5. Raise the translate frame and picker up to a convenient working height so that you can access the underside of the picker. Insert a screwdriver into the vertical motor gear box to hold the frame in position. (see [Figure 26](#)).

Pull the frame up to the desired position, and insert a screwdriver into the hole at the rear of the vertical motor gear box to prevent the frame from descending.

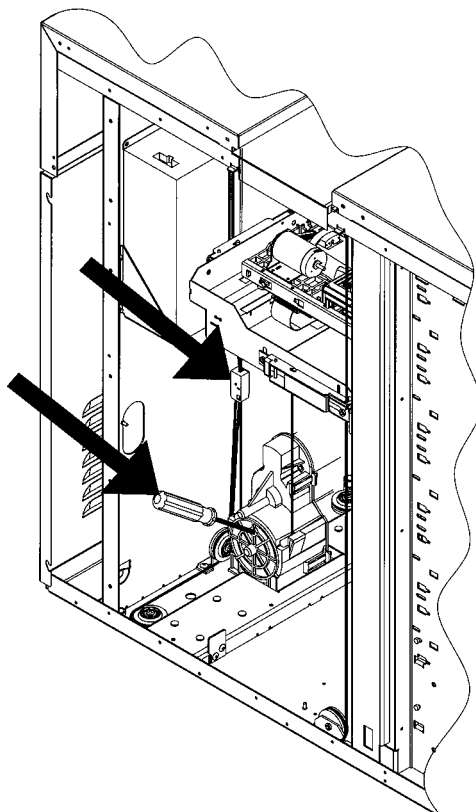


Figure 26: Holding the Translate Frame in Position

6. Remove the T-10 sheet metal screw that holds the capture spring down (see [Figure 27](#)).

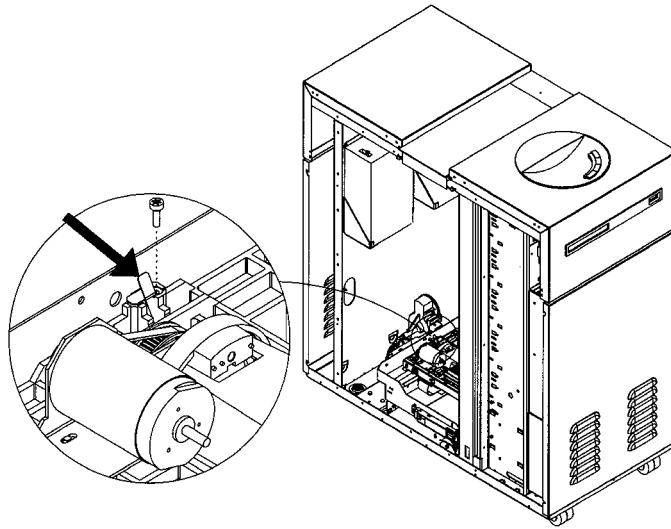


Figure 27: Releasing the Picker Capture Bracket

7. Remove the capture spring by pulling it up and out of the unit.
8. Rotate the capture bracket 90 degrees and pull the bracket down and out (see [Figure 28](#)).

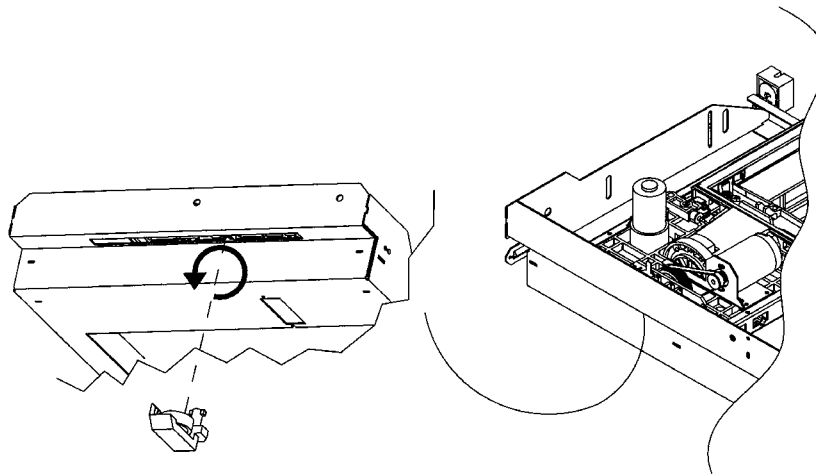


Figure 28: Removing the Translate Frame Capture Bracket

9. Remove the tool you inserted into the rear of the vertical motor gear box and lower the translate frame and picker to the bottom of the jukebox.

10. Tilt up the rear end of the picker and left it out of the frame (see [Figure 29](#)).

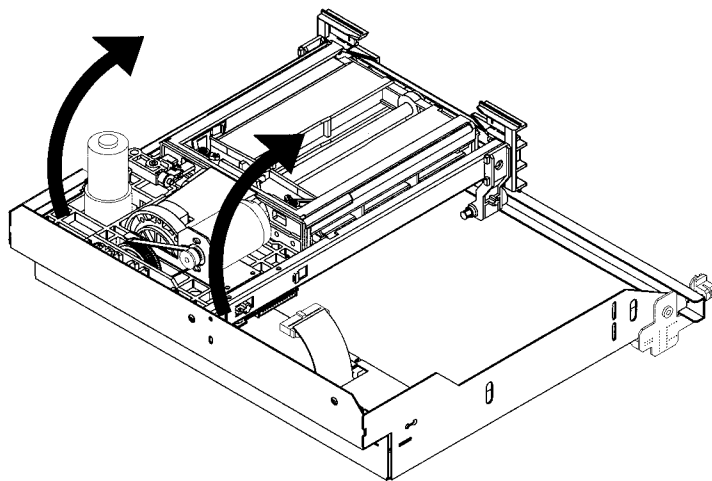


Figure 29: Rotating the Picker Assembly Out of the Translate Frame

Removing/Replacing the Translate Frame (Including the Picker)

1. Remove the right access panel (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).



Caution: Raise the translate frame only by pulling on the vertical drive rope (see the top arrow on [Figure 30](#)). The frame can be twisted by pulling it by the sides. A twisted frame may cause various errors in operation.

2. Raise the translate frame up approximately midway up and secure it with a screwdriver inserted into the hole on the rear of the vertical motor gear box (see [Figure 30](#)).

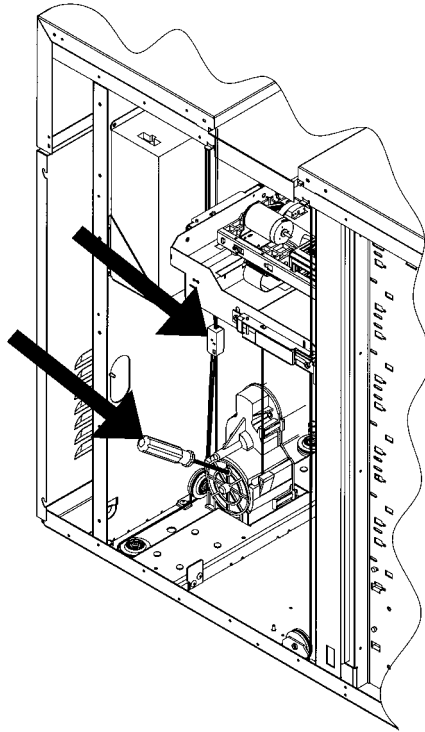


Figure 30: Raising the Translate Frame and Holding the Frame in Position

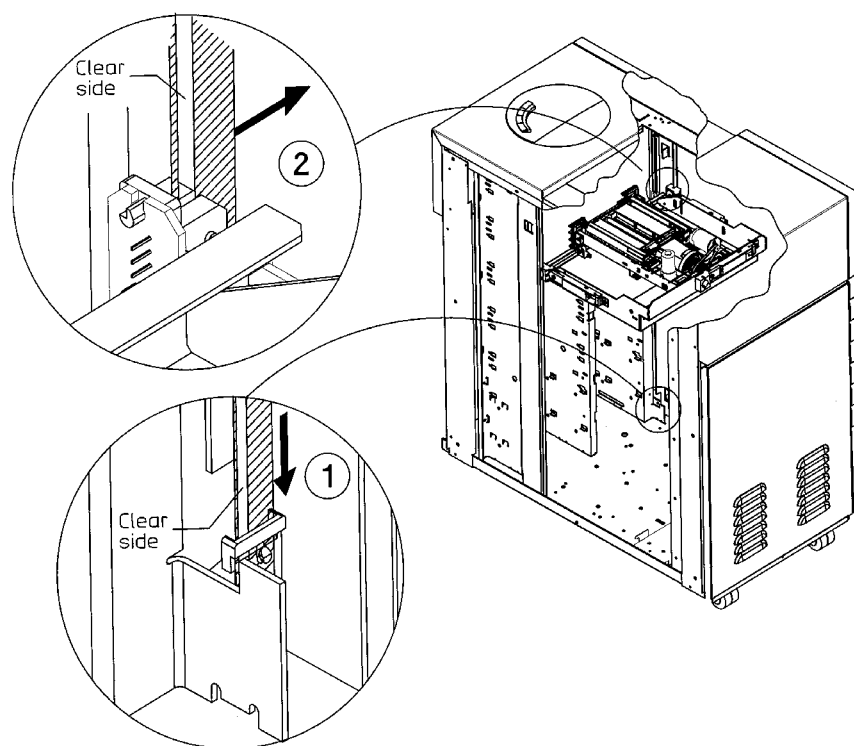


Figure 31: Releasing the Lower End of the Vertical Encoder Strip

3. Unhook the encoder strip and hang it out of the way (see [Figure 31](#)).

Pull down on the bottom of the encoder strip to release the strip from its retaining peg. Once released, the strip will slide up and out of the plastic guide.



WARNING: The edges of the vertical encoder are sharp. Be careful.



Caution: Handle the encoder strip with care and ONLY BY THE SOLID SIDE. The CLEAR side is made up of very fine slits and CAN BE EASILY DAMAGED.

4. Remove the “visual locator” bracket on the (front) side of the picker translate frame (see [Figure 32](#)).

Remove the two T-20 screws holding the bracket and rotate the bracket off.

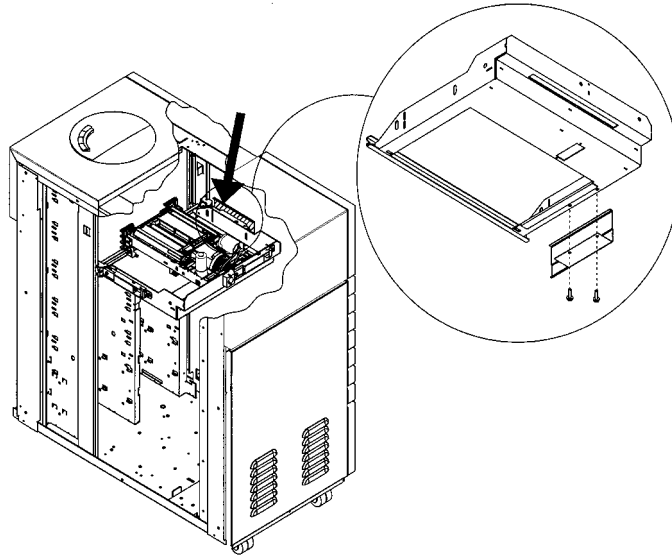


Figure 32: The Visual Locator Bracket

5. Disconnect the umbilical cable on the underside of the translate frame (see [Figure 33](#)).

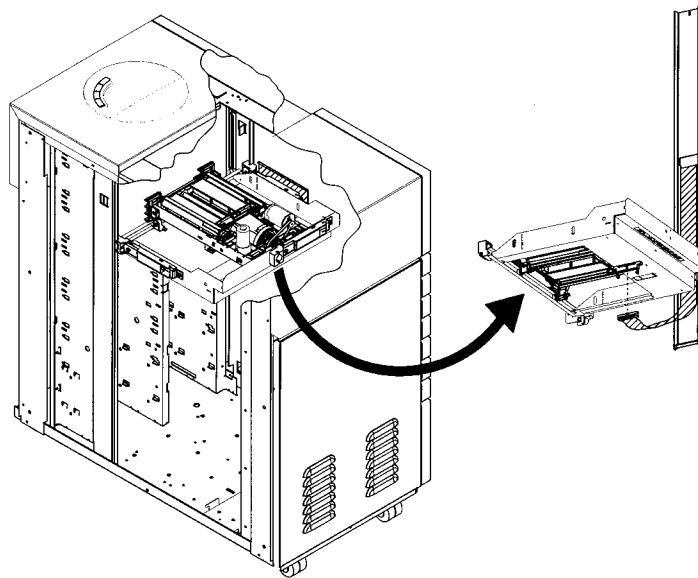


Figure 33: Disconnecting the Vertical Umbilical Cable From the Translate Frame

6. Remove the tool you inserted into vertical motor gear box and move the translate frame down to the bottom of the jukebox.
7. Remove the three rope tensioners from the frame (#1, #2, and #3 on [Figure 34](#)).
 - a. Remove two T-25 long screws per tensioner. Start with the tensioner at the rear end of the frame (#1 on [Figure 34](#)).
 - b. Pull all three rope tensioners free of the translate frame.
 - c. Pull the *rear* tensioner upwards to raise all three tensioners up and out of your way.

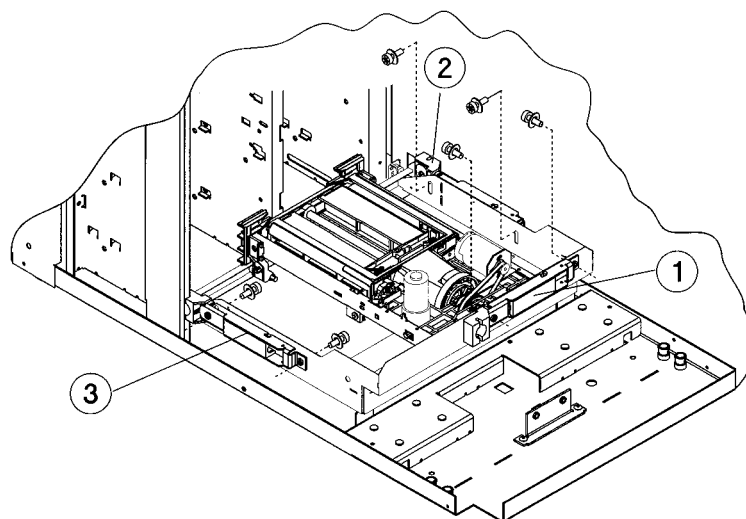


Figure 34: Removing the Tensioners From the Translate Frame



Caution: In the next step, ensure that the plastic rail guides are not damaged when the translate frame is removed.

8. Rotate the rear of the translate frame up and then remove the frame out to the side (see [Figure 35](#)).

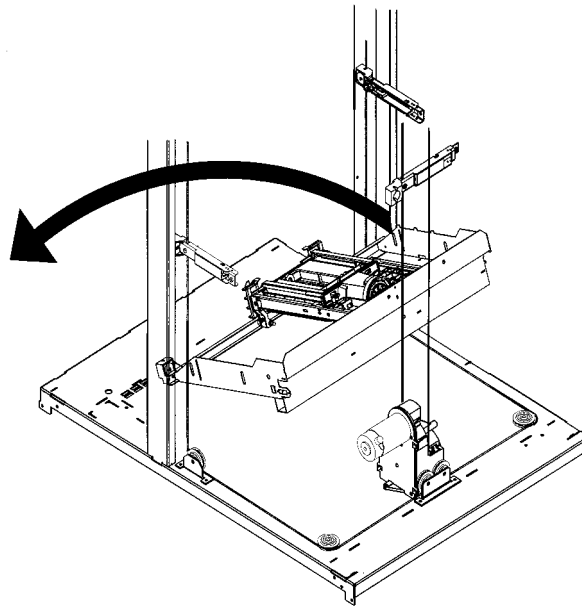


Figure 35: Rotating the Translate Frame Out of the Chassis

Reassembly Notes

Note: Take care to install the translate frame properly. If the frame is not mounted level, errors will be caused that will prevent the library from operating. The following steps explain proper mounting of the frame.

1. Place the frame back in the chassis. Let it rest on its support points. The rear of the frame rests on a ledge on the vertical motor.
2. Pull the tensioners down so that they are next to their mount points on the sides and rear of the translate frame. Press them into the side of the translate frame.
3. While tightening the mounting screw in a tensioner, push down on the frame at that point to make sure that the translate frame remains on its lower stop while you tighten the mounting screw.
4. Check that the translate frame is mounted level on the cables by centering the picker and pushing the frame down lightly and quickly. If you hear a “click” it means that the frame has slack and needs adjustment.

If adjustment is necessary, remount the frame on the tensioners as described in [step 3](#) and retest.

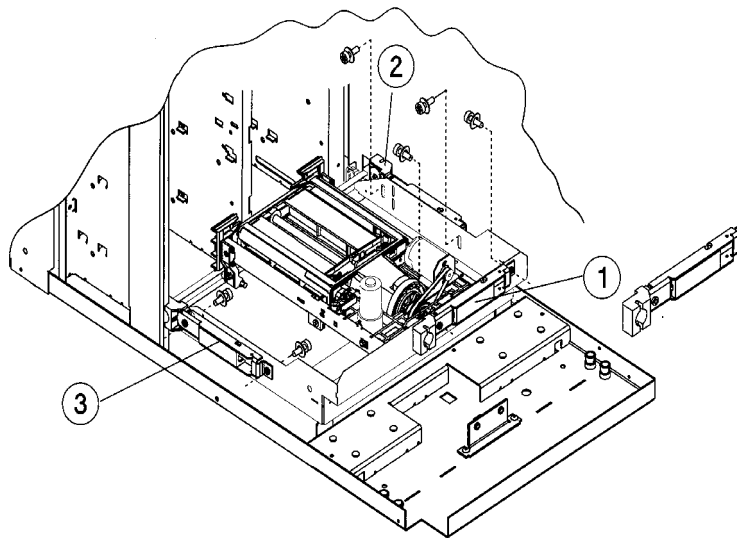


Figure 36: Remounting the Tensioners on the Translate Frame

Mounting the Vertical Encoder Strip

Move the translate frame up and lock it while reinstalling the encoder strip.

Ensure that the encoder strip passes through the sensor slot on the sensor PCA mounted on the side of the picker frame. The strip may be moved off its mounting peg while you are replacing the translate frame in the chassis.

Removing/Replacing the Vertical Encoder Strip

1. Remove the right access panel (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).



WARNING: The edges of the vertical encoder are sharp. Be careful.



Caution: Handle the encoder strip with care and ONLY BY THE SOLID SIDE. The CLEAR side is made up of very fine slits and CAN BE EASILY DAMAGED.

2. Release the lower end of the vertical encoder strip (see #1 on [Figure 37](#)).
3. Unhook the top of the encoder strip from the spring and remove ([Figure 37](#)).

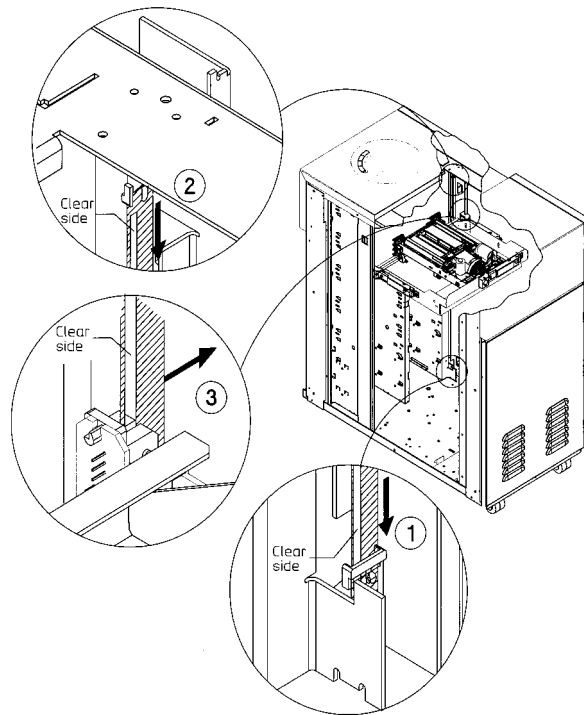


Figure 37: Releasing the Ends of the Vertical Encoder Strip

Replacing the Vertical Motion Motor

1. Remove the left access panel (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Disconnect the two power cables to the vertical motor (see [Figure 38](#)).

Note: Remember the orientation of the motor before removing it in the next step. The motor must be replaced in the same position on reassembly.

3. Remove two T-15 motor mounting screws on the gear box. Remove the motor (see [Figure 38](#)).

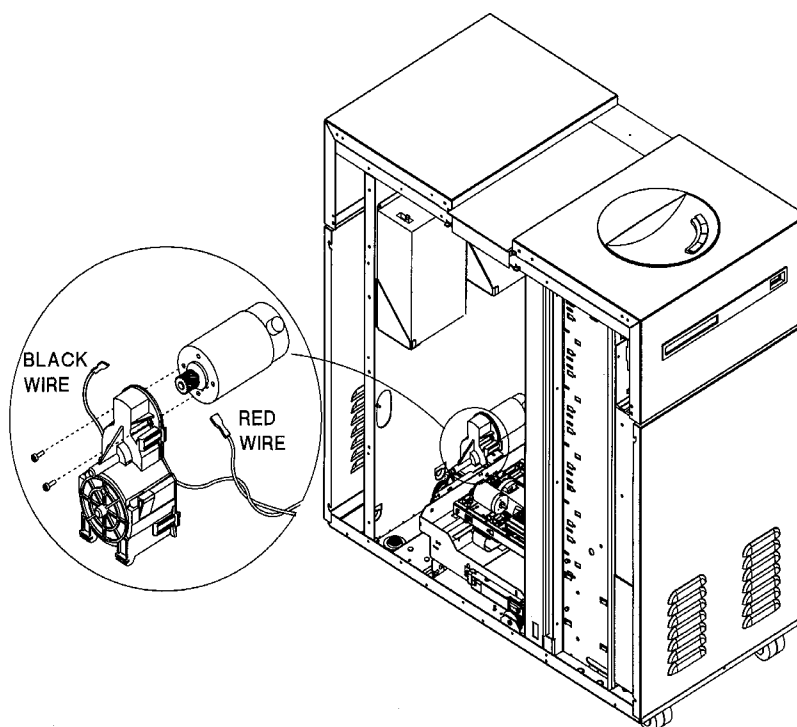


Figure 38: Cables and Mounting Screws on the Vertical Motion Motor

Replacing the Vertical Motor Gear Box

1. Remove the right access panel (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Remove the translate frame (refer to “[Removing/Replacing the Translate Frame \(Including the Picker\)](#)” on page 77).
3. Pull the rear tensioner upwards to raise all three tensioners up to a convenient working height.

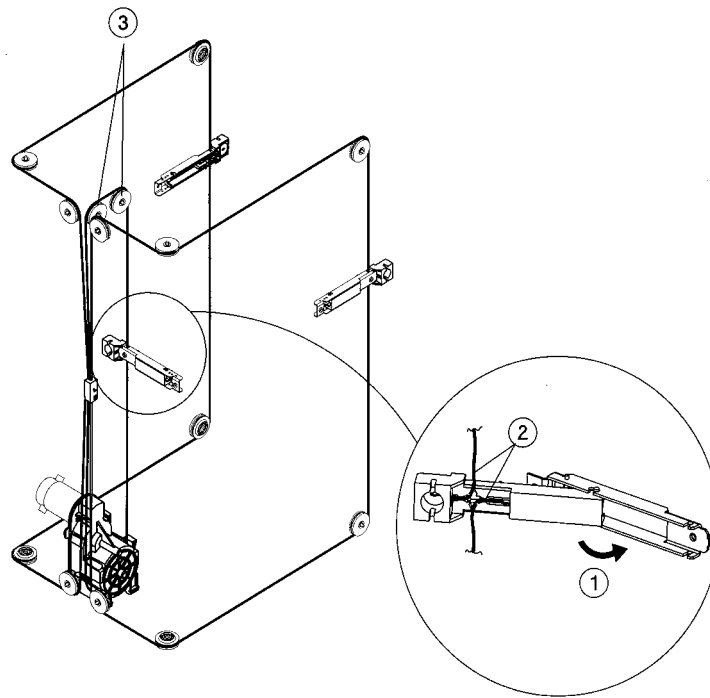


Figure 39: Opening the Tensioners to Relieve Cable Tension

4. Release the tension on the rear rope tensioner (drive rope) using the following steps (see [Figure 39](#)):
 - a. Pull back the metal section to release the metal securing tab seated in the plastic section.
 - b. Swing the metal section out and off the pivoting pegs on the plastic section.
5. Take the drive rope off the upper pulleys (see #3 on [Figure 39](#)).
6. Remove the drive rope from the rear tensioner (see #2 on [Figure 39](#)).
 - a. Unfasten the spring.
 - b. Pull both ends of the rope out of the tensioner.
7. Remove the T-15 screw from the rope coupler cover (see #1 on [Figure 39](#)).

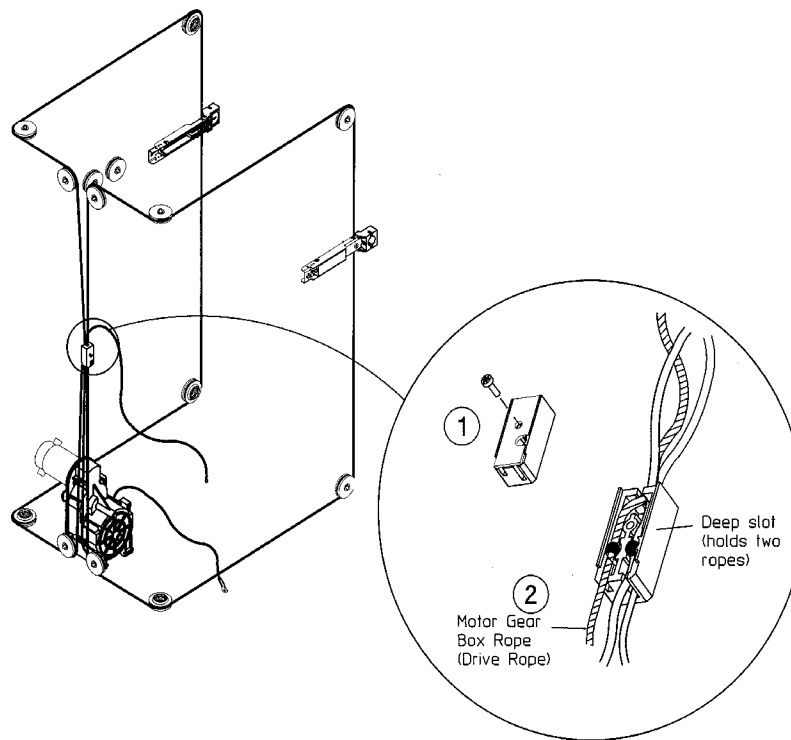


Figure 40: Disconnecting the Rope Coupler

8. Remove the drive rope from the coupler (see #2 on [Figure 40](#))
9. Remove the drive motor and gear box (see [Figure 41](#)).
 - a. Remove the T-25 screw from the base of the gear box.
 - b. Tip the gear box forward and lift it out.

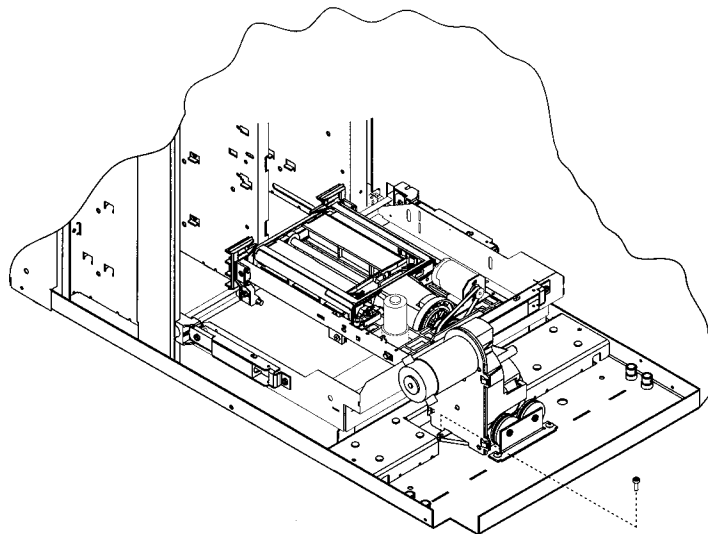


Figure 41: Vertical Motor Gear Box Mounting Screw

Reassembly Notes

When replacing the rear rope tensioner, be sure that the tensioner spring area is positioned so that it faces you. This ensures that the rope tensioner is in the right position to fasten to the translate frame (see [Figure 42](#)).

To give yourself enough slack in the, fasten the drive rope ends to the rope tensioner *before* hanging the drive rope over the top two pulleys.

Before applying tension by setting the rope tensioners, insert the ropes into the rope coupler and attach the coupler cover plate (see [Figure 43](#)).

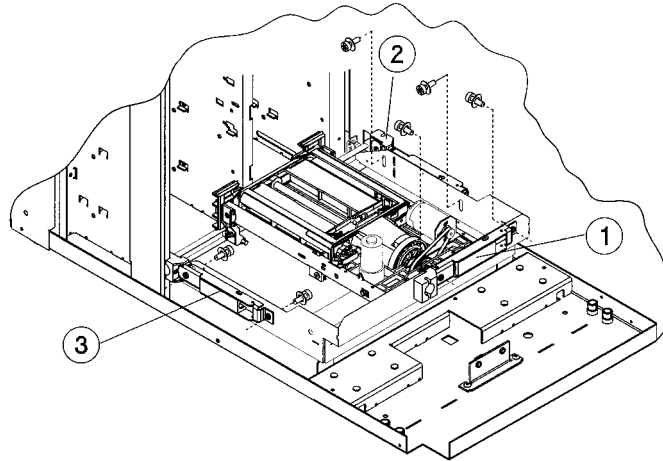


Figure 42: Positioning the Tensioner to Mount on the Translate Frame

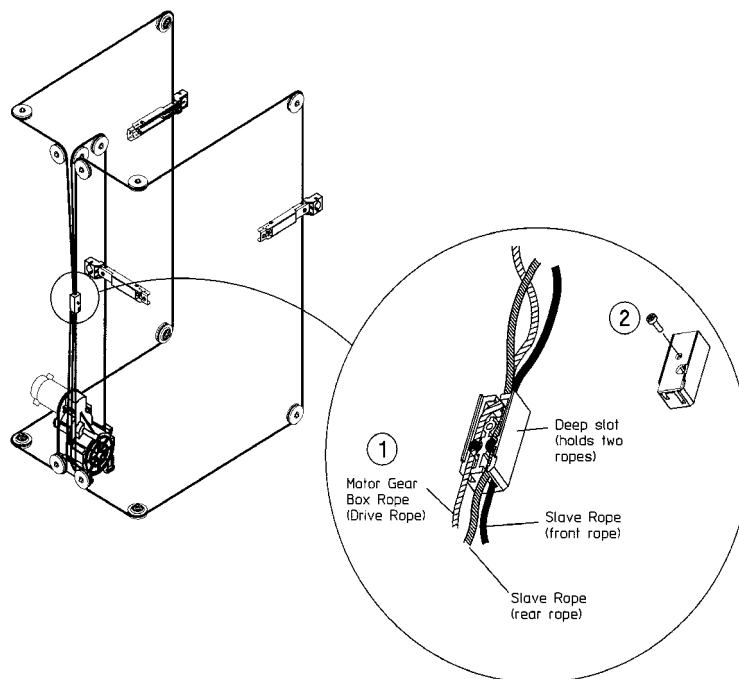


Figure 43: Placement of the Ropes in the Rope Coupler

Replacing the Controller PCA

1. Remove the right access panel (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Remove the six T-20 screws on the controller PCA cover (see [Figure 44](#)).

Note the two reference pin holes on the rear edge of the cover. Use these pins to position the cover correctly during reassembly.

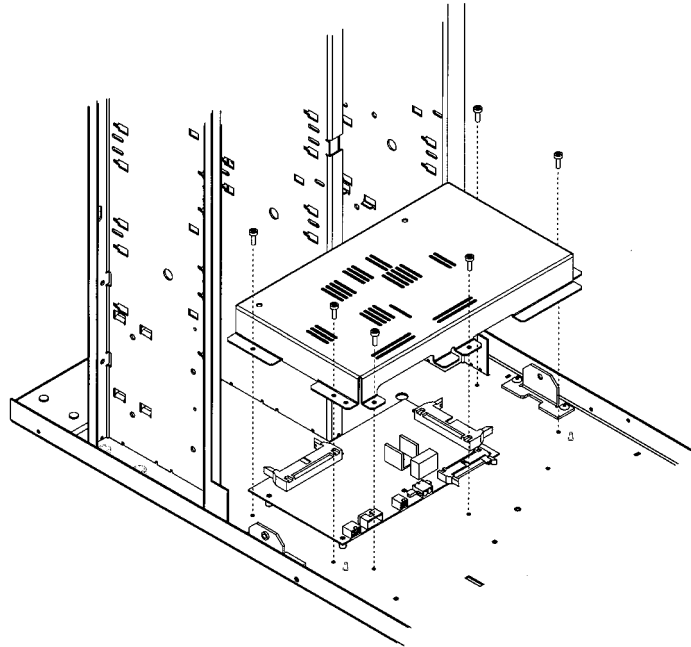


Figure 44: Removing the Controller PCA Cover

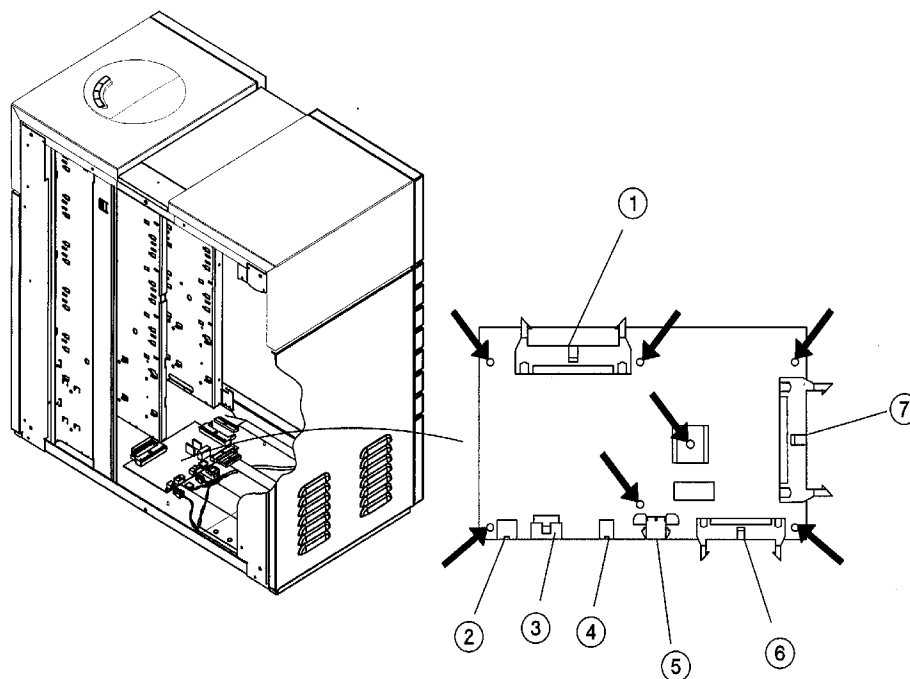
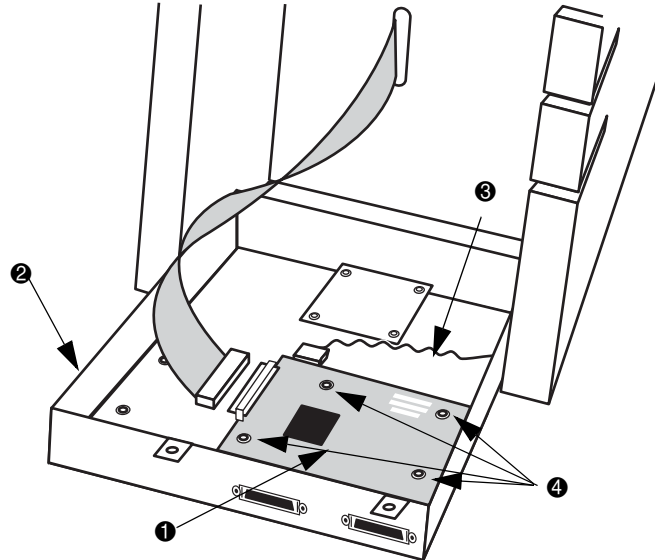


Figure 45: Controller PCA Cables and Screws

3. Disconnect the following cables from the controller PCA (see [Figure 45](#)):
 - SCSI cable (#1)
 - Power cable (#2)
 - Motor encoder and power cables (#3)
 - Picker cable (#4)
4. Remove the seven T-20 screws from the controller PCA and remove the PCA.

Replacing the Buffer Assembly

1. Remove the back access panel (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).
2. Remove the four T-20 screws holding the buffer module to the chassis.



- | | |
|-----------------------|-------------------------------|
| ① Buffer board | ③ Power cable to buffer board |
| ② Buffer board module | ④ Screws |

Figure 46: Removing and replacing the buffer assembly

3. Disconnect the cables to the buffer assembly (see [Figure 46](#)).
4. Remove the four T-15 screws and remove the buffer assembly.
5. To install the replacement buffer assembly, follow steps 1 through 4 in reverse order.

Replacing the SCSI Cable

1. Remove the right and rear access panels (refer to “[Access for 1000ux/1900ux/2300ux Models](#)” on page 45).

2. Remove the SCSI cable from the interface PCA.

Do step 2 and step 3 of “[Replacing the Buffer Assembly](#)” on page 90. Remove only the SCSI cable on the bottom of the interface PCA.

3. Remove the SCSI cable from the controller PCA.

Do step 2 through step 4 of “[Replacing the Controller PCA](#)” on page 88 to remove the controller PCA. Remove the SCSI cable from underneath the controller PCA.

Checking the RFI Adjustments

Note: The following RFI adjustments must be maintained after servicing the jukebox. Depending on the service performed, these configurations may be altered. The purpose of this section is to remind you of the RFI adjustments that must remain in place.

Be sure that there is an RFI clamp holding the SCSI and GPIO cable together as shown in [Figure 47](#). (Clamp (#1) has end clips (#2) to hold the two plates together.

Be sure that there are cable clamps holding the SCSI and GPIO cables to the side of the jukebox as shown in [Figure 48](#).

Be sure that there is an EMI strip installed on the right-side panel as shown in [Figure 49](#).

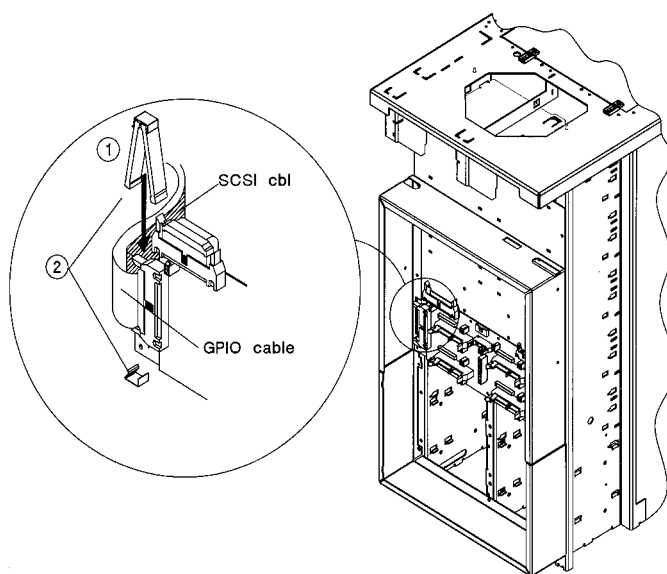


Figure 47: RFI Clamp on the GPIO and SCSI Cables

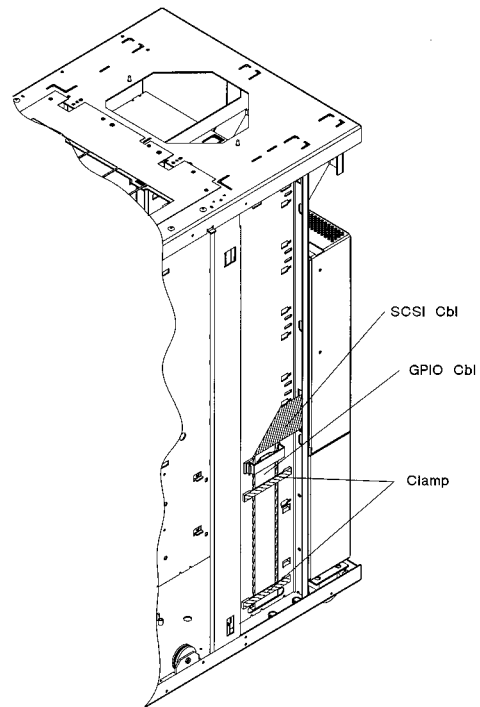


Figure 48: Cable Clamps on the GPIO and SCSI Cables

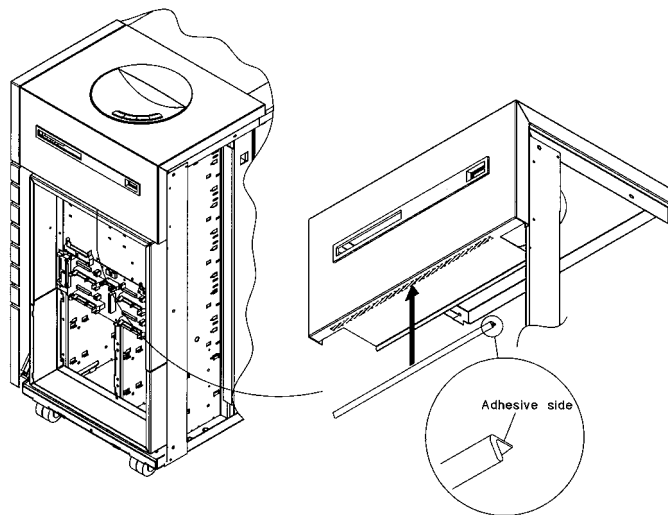


Figure 49: EMI Strip on the Right-Side Panel

FRU Removal and Replacement for 3800ux/7100ux Models

The following procedures describe removal and replacement procedures for 1000ux/1900ux/2300ux jukebox FRUs.

- [Replacing an Optical Drive — Jukebox Offline](#), page 95
- [Replacing a Media Detect Station](#), page 98
- [Replacing a Power Supply](#), page 99
- [Replacing the Mailslot Assembly](#), page 100
- [Replacing the Control Panel Assembly](#), page 101
- [Replacing an Interposer PCA \(Upper and/or Lower\)](#), page 102
- [Replacing the Picker](#), page 107
- [Removing/Replacing the Translate Frame \(Including the Picker\)](#), page 111
- [Removing/Replacing the Encoder Strip](#), page 118
- [Replacing the Vertical Motion Motor](#), page 120
- [Replacing the Vertical Motor Gear Box](#), page 121
- [Replacing the Controller PCA](#), page 125
- [Replacing the Power Distribution PCA](#), page 126
- [Replacing a Buffer Assembly](#), page 127
- [Replacing the Vertical-Path-Clear PCA](#), page 129
- [Checking the RFI Adjustments](#), page 130

Replacing an Optical Drive — Jukebox Offline

Note: Before replacing a drive, obtain the most current version of the jukebox controller and drive firmware for the model and option of the jukebox you are servicing.

Note: Online drive repair is not supported for 3800ux/7100ux models.

1. Remove the three right-side panels and the upper and lower RFI panels (see [Figure 50](#)).
2. Remove all drive cables for the drive enclosure that contains the failed drive (see [Figure 50](#)).
 - #1 - drive power cable (for both drives)
 - #2 - drive interface cable (split, one for each drive)
 - #3 - drive enclosure fan power cable
 - #4 - SCSI cable (to both drives)
3. Remove the T-20 screws from each side of the drive enclosure. Remove the drive enclosure from the chassis (see #5 on [Figure 50](#)).

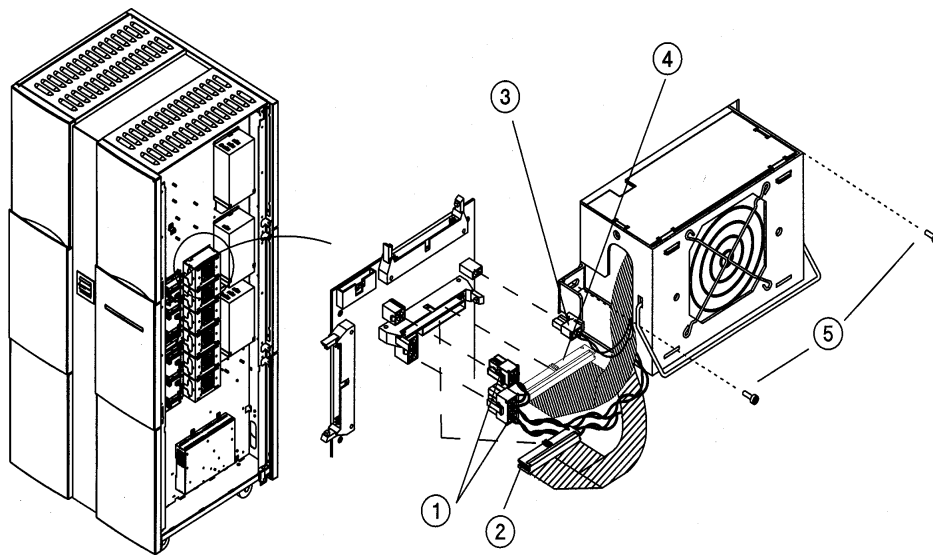


Figure 50: Removing the Cables and Screws

4. Remove the four T-10 screws holding the top and bottom access plates on the drive enclosure (see #1 and #2 in [Figure 51](#)). Remove the plates.
5. Remove the four T-10 screws that hold the *failed* drive in the drive enclosure and slide the drive forward a small amount to give you room to remove the cables. (#3 screws on [Figure 51](#) hold the upper drive, #4 screws hold the lower drive.)

6. Remove the drive cables from the rear of the failed drive (see [Figure 52](#).
 - #1 - drive power cables
 - #2 - SCSI cable
 - #3 - drive interface cables
7. Slide the failed drive out of the enclosure.

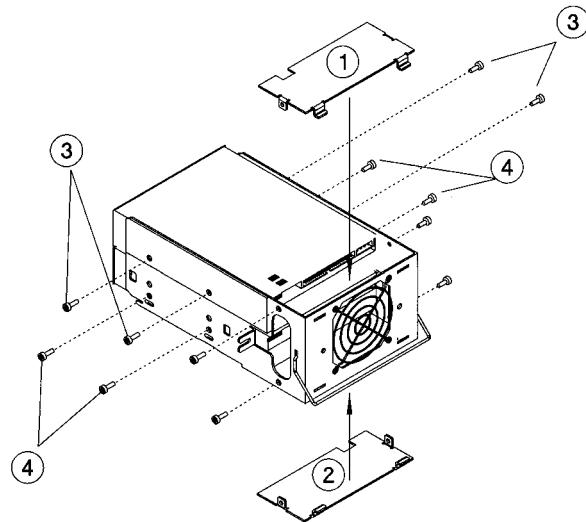


Figure 51: Unmounting a Drive From the Enclosure

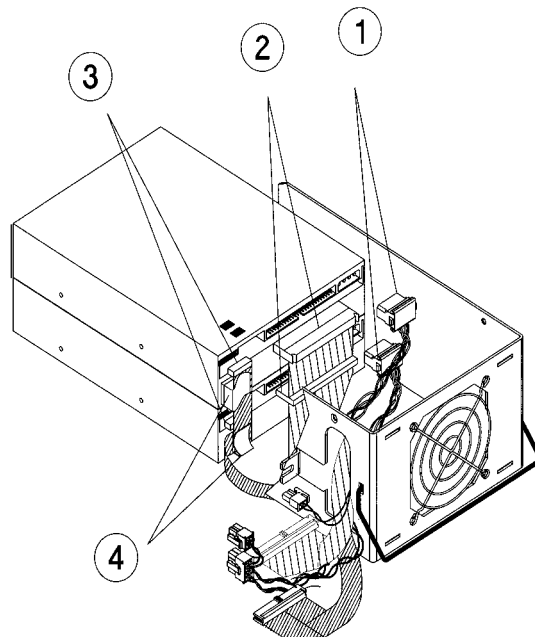


Figure 52: Removing Cables From a Drive

8. *If there is a disk in the drive*, use a disk eject tool to remove the disk from the drive.
 - a. Insert the eject tool (or paper clip) into the disk eject access hole (see [Figure 53](#)).
 - b. When you feel firm pressure on the tip, push forward. The disk mechanism will eject the disk.

Note: Remember whether the “A” or “B” side faces up when you remove the disk. The disk must be inserted into the replacement drive with the same orientation.

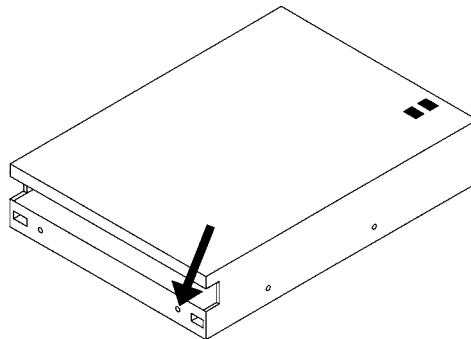


Figure 53: Disk Eject Hole

9. Slide the replacement drive into the enclosure nearly all the way. Leave room to connect the drive cables to the rear of the drive.
10. Connect the drive power cable, SCSI cable, and drive interface cable to the rear of the drive (see [Figure 52](#)).
While placing the drive interface cable onto the drive, slip the plastic cable guide around the interface cable, remove the adhesive backing, and stick the guide to the rear of the drive.
11. Insert and tighten the four T-10 screws that mount the drive into the enclosure (see [Figure 51](#)).
12. *If a disk was removed from the failed drive*, replace the disk into the drive in the same orientation.
13. Insert the drive enclosure into the chassis and secure the enclosure with two T-20 screws (see #5 on [Figure 51](#)).
14. Connect all drive cables to the interposer PCA (see [Figure 50](#)).
15. Turn on the jukebox.
16. Go the INFO * menu and check the current firmware revision level of the jukebox under REVISION and for the drives under DRIVE FW *.
17. Download firmware if necessary. Refer to “[Using HP StorageWorks Library and Tape Tools](#)” on page 42.
18. If a download is not necessary, replace the lower RFI panel and the three right-side panels.

Replacing a Media Detect Station

1. Remove the two lower right-side panels and the lower RFI panel (see [Figure 4](#)).
2. The media detect station is located in drive position 11/12 (the lowest drive position). Remove the fan cable from the media detect station.

Note: Note the orientation of the media detect station before removing it from the drive enclosure. It occupies drive position 11, though the drive enclosure occupies both 11 and 12.

3. Remove the media detect station from the drive enclosure:
 - a. Remove the T-15 screw securing the media detect station sleeve (black plastic) to the sheet metal support, and slide off the sleeve.
 - b. Unmount the media detect station support (gray sheet metal) from the inside of the drive module by removing four T-10 screws.
4. Install the new media detect station:
 - a. Mount the media detect station support (gray sheet metal) to the inside of the drive module in drive position 11 using four T-10 screws.
 - b. Slide the media detect station sleeve (black plastic) into the sheet metal support, and secure it using a T-15 screw.



Caution: To avoid damaging optical media and subsequent data loss, ensure that the screw does not project into the surface of the plastic on the media detect station.

5. Reattach the media detect station's fan cable.
6. Reinstall the lower RFI panel and the two lower right-side panels.

Replacing a Power Supply

1. Remove the three right-side panels and the upper and lower RFI panels (see [“Access for 3800ux/7100ux Models”](#) on page 46).
2. Remove the cables from the power supply that you are replacing (see [Figure 54](#)).
 - The top and bottom arrows identify the 5/12 V power supplies
 - The middle arrow identifies the 24 V power supply
3. Remove the power supply.

Remove the two mounting screws located on the top of the power supply bracket and rotate the power supply out and off the support bracket.

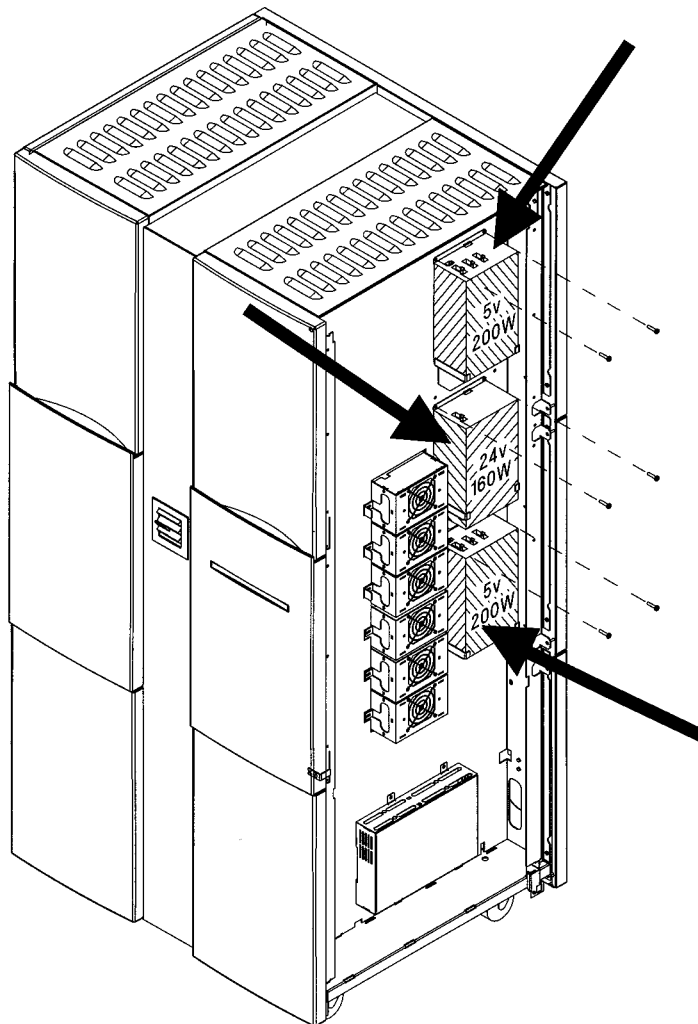


Figure 54: Cables and Mounting Screws on the Power Supplies

Replacing the Mailslot Assembly

1. Remove the three right-side panels and the upper and lower RFI panels (see “[Access for 3800ux/7100ux Models](#)” on page 46).
2. Ensure that the mailslot sensor cable is disconnected from the upper interposer PCA (see [Figure 55](#)).
3. Remove the two T-20 mailslot mounting screws from the bottom of the mailslot (#2 on [Figure 55](#)).
4. Slide the mailslot out of the jukebox (see #3 on [Figure 55](#)).

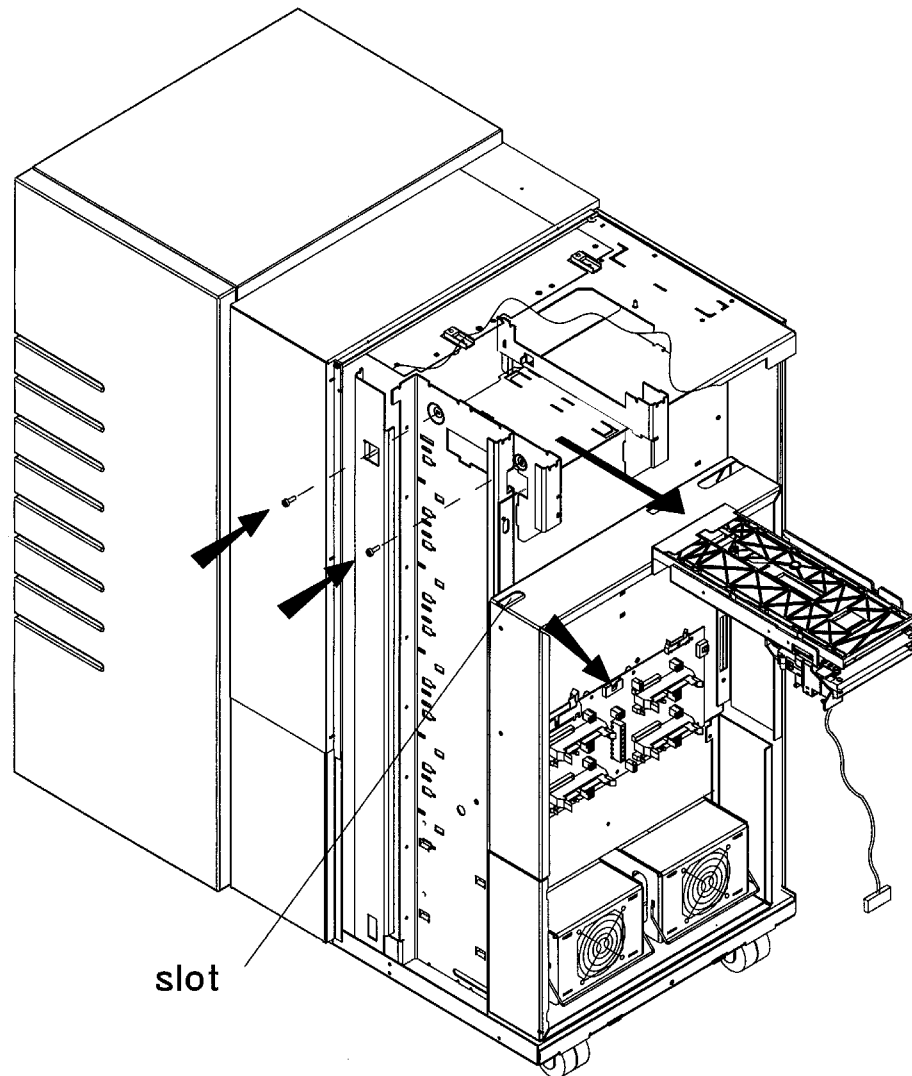


Figure 55: Removing the Mailslot Assembly

Replacing the Control Panel Assembly

1. Remove the three left-side panels (see “[Access for 3800ux/7100ux Models](#)” on page 46).
2. Disconnect the control panel cable from the control panel (#1 arrow [Figure 56](#)).
3. Remove the eight T-15 screws that mount the control panel to the front window. Remove the control panel (see [Figure 56](#)).

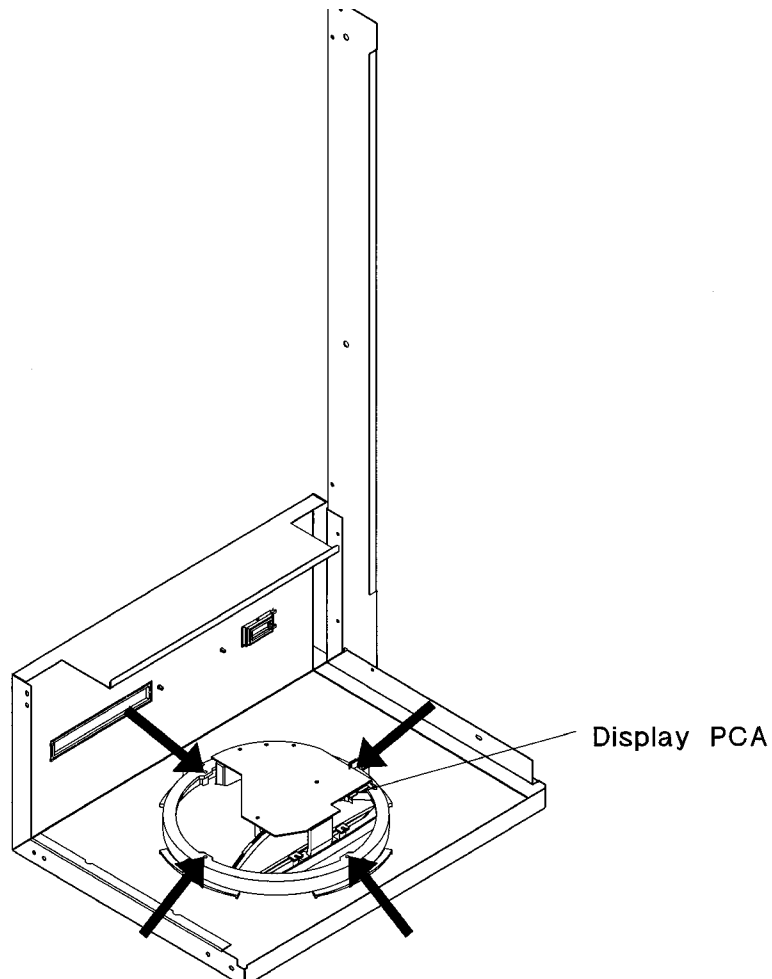


Figure 56: Control Panel Mounting Screws and Interface Cable

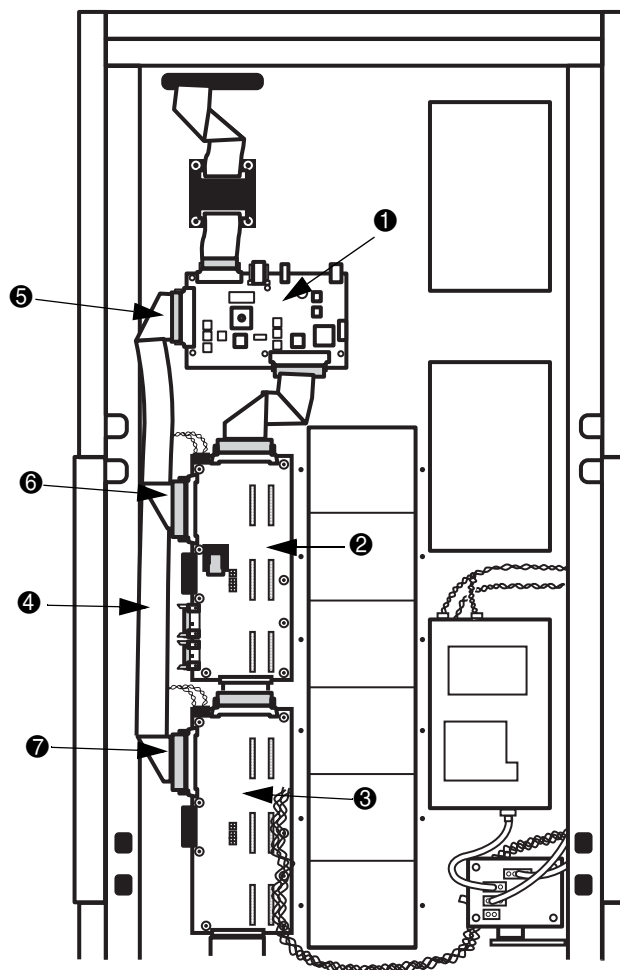
Replacing an Interposer PCA (Upper and/or Lower)

Note: IF YOU ARE REPLACING AN UPPER INTERPOSER PCA, CHECK TO SEE IF THERE IS A CONFIGURATION MODULE MOUNTED ON THE PCA. IF A CONFIGURATION MODULE IS INSTALLED, TRANSFER THE MODULE TO THE REPLACEMENT PCA.

1. Remove the lower and middle right-side access panels (see “[Access for 3800ux/7100ux Models](#)” on page 46).
2. Disconnect all cables to the interposer PCA(s) (see [Figure 57](#) through [Figure 59](#)).

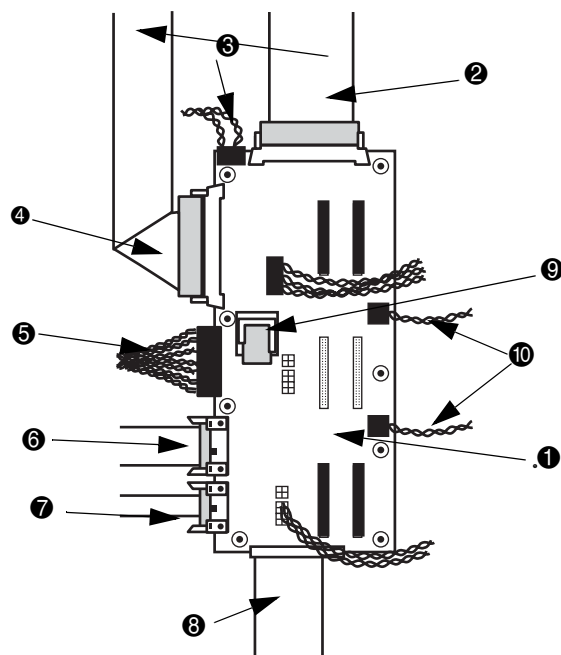


Caution: Take note of the cable orientations before removing them. It is essential that the cables are oriented properly when reattaching them, in order to avoid damage.



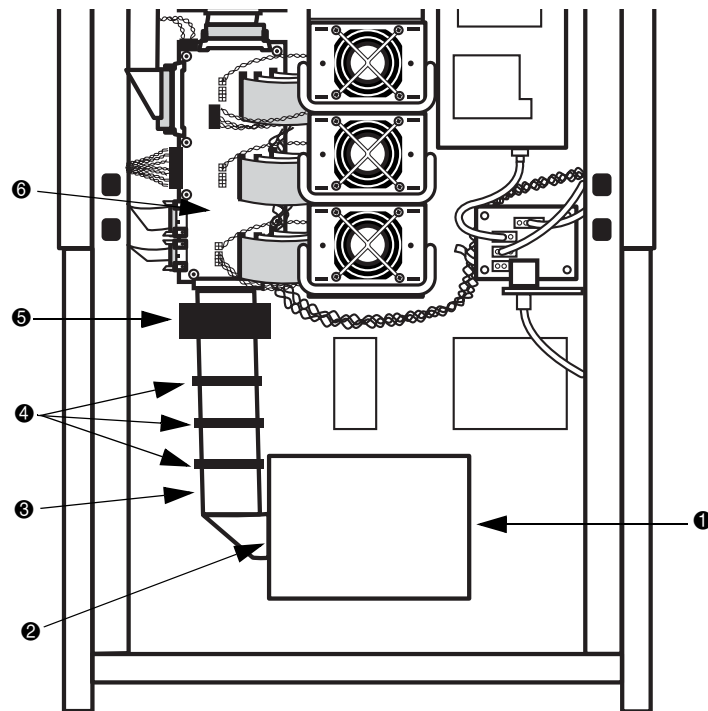
- | | |
|--------------------------|---|
| ❶ Controller board | ❹ 50-pin GPIO cable |
| ❷ Upper interposer board | ❺ 50-pin GPIO cable connected to controller board |
| ❸ Lower interposer board | ❻ 50-pin GPIO cable connected to upper interposer |
| | ❼ 50-pin GPIO cable connected to lower interposer |

Figure 57: GPIO cable connections



- | | |
|-----------------------------|---------------------------------|
| ❶ Interposer board (upper) | ❸ Upper path clear sensor cable |
| ❷ 50-pin library SCSI cable | ❹ 50-pin GPIO cable |
| ❺ Mailslot cable | ❶ Front panel cable |
| | ❷ Lower path clear sensor cable |
| | ❸ LVD SCSI cable |
| | ❹ Configuration module |
| | ❺ Power cables |

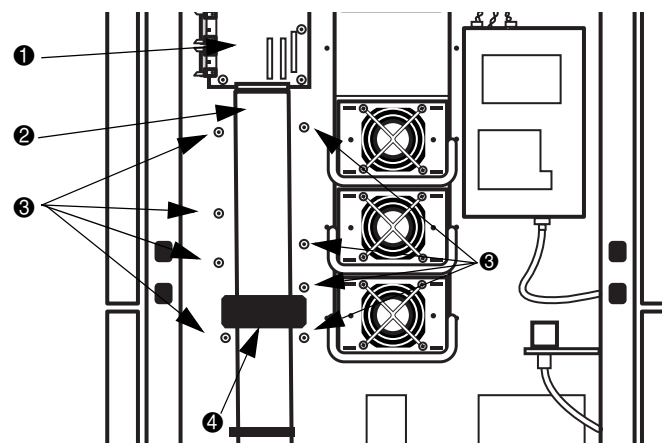
Figure 58: Cable connections for upper interposer PCA



- | | |
|-----------------------|-----------------------------|
| ① Buffer board module | ④ Cable clamps |
| ② Cable access slot | ⑤ Black self-adhesive strip |
| ③ LVD SCSI cables | ⑥ Lower interposer board |

Figure 59: LVD SCSI cable connections

3. Remove the eight T-20 screws holding the interposer to the chassis (see [Figure 60](#)).



- | | |
|---|---|
| ① Upper interposer board | ③ PEMs standoffs for lower interposer board |
| ② LVD SCSI cable for upper interposer board | ④ Black self-adhesive strip |

Figure 60: Removing the interposer PCA

4. Remove the interposer PCA from the chassis.



Caution: When reattaching cables to the interposer PCA(s), ensure that the cables labeled “Bus 1” attach to the upper interposer, and cables labeled “Bus 2” attach to the lower interposer. Also, it is essential to make sure the cables are oriented properly to avoid damage to them.

5. To install the replacement interposer PCA, follow steps 1 through 4 in reverse order.

Replacing the Picker

1. Remove the lower and middle right-side access panels (see “[Access for 3800ux/7100ux Models](#)” on page 46).

Extra panels are removed in [Figure 61](#) for parts visibility in this description.

2. Pull the tab on the end of the picker umbilical cable to disconnect the cable from the bottom of the picker (see the arrow on [Figure 61](#)).

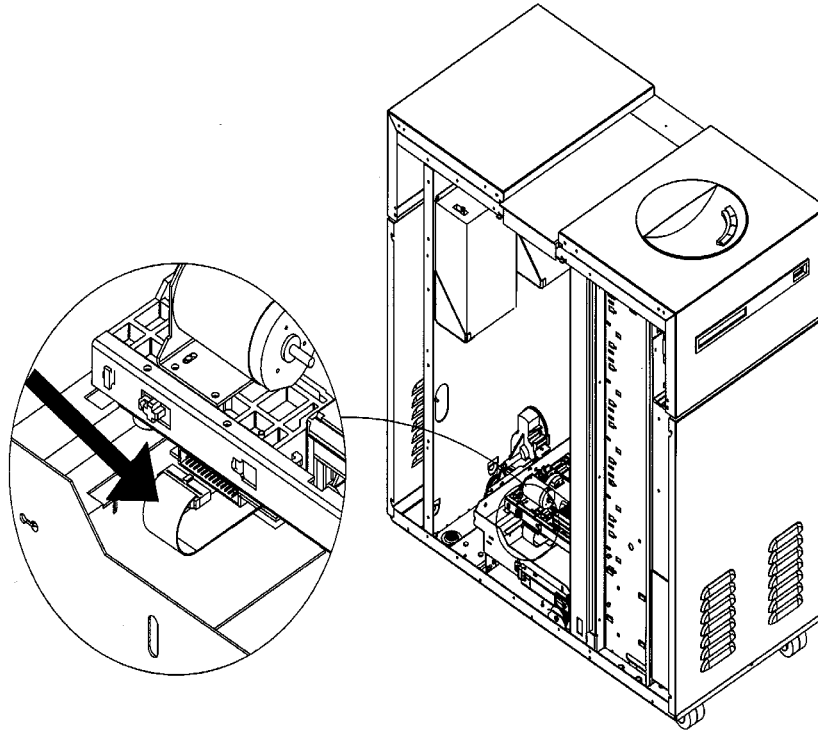


Figure 61: Picker Umbilical Cable

3. Release the translate cable from the side of the translate frame nearest the front of the jukebox (see [Figure 62](#)):
 - a. Depress the tension spring (#1) on the side of the translate frame to release the tension on the cable and allow you to pass the cable up through the slotted hole (#2).
 - b. Slide the cable into the pinch slot on the side of the picker (#3). Placing the cable in the pinch slot prevents the cable from unraveling from the central picker hub.

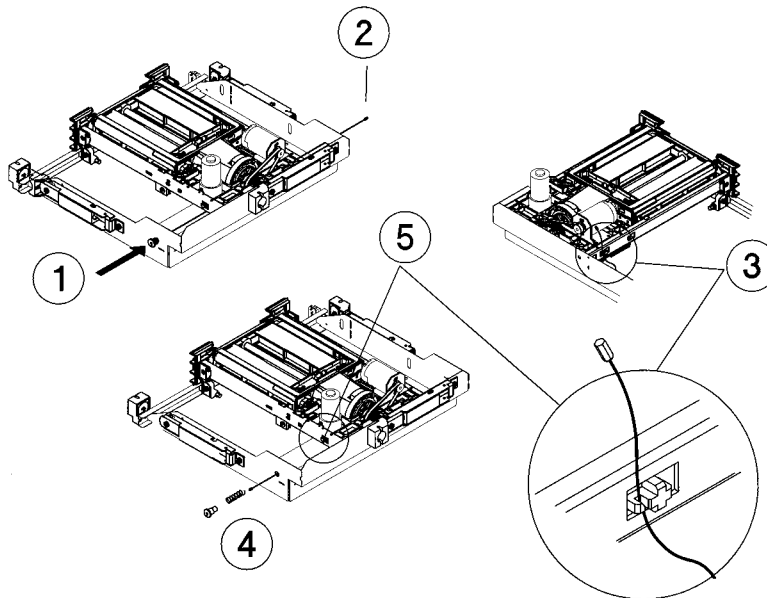


Figure 62: Releasing and Stowing the Picker Translate Cable

4. Release the translate cable from the side of the translate frame nearest the rear of the jukebox (see [Figure 62](#)):
 - a. Remove the spring and slotted plug that holds the translate cable (#4). The cable passes through a hole in the side of the frame and into a slotted plug with a tensioner spring. Remove the spring and slotted plug.
 - b. Slide the cable into the pinch slot on the side of the picker (#5). Placing the cable in the pinch slot prevents the cable from unraveling from the central picker hub.



Caution: Raise the translate frame only by pulling on the vertical drive rope. The frame can be twisted by pulling it by the sides. A twisted frame may cause various errors in operation.

5. Raise the translate frame and picker up to a convenient working height so that you can access the underside of the picker (see #1 on [Figure 63](#)).

Pull the frame up to the desired position, and insert a screwdriver into the hole at the rear of the vertical motor gear box to prevent the frame from descending (#2).

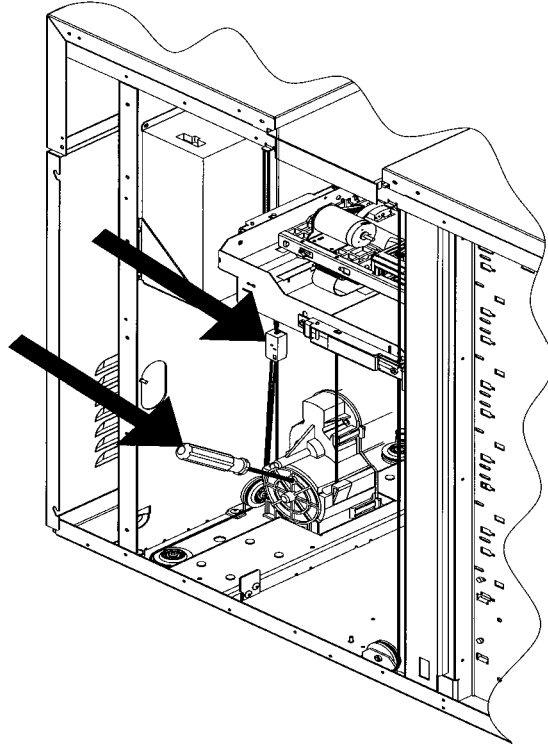


Figure 63: Holding the Translate Frame in Position

6. Remove the T-10 sheet metal screw that holds the capture spring down (see [Figure 64](#)).

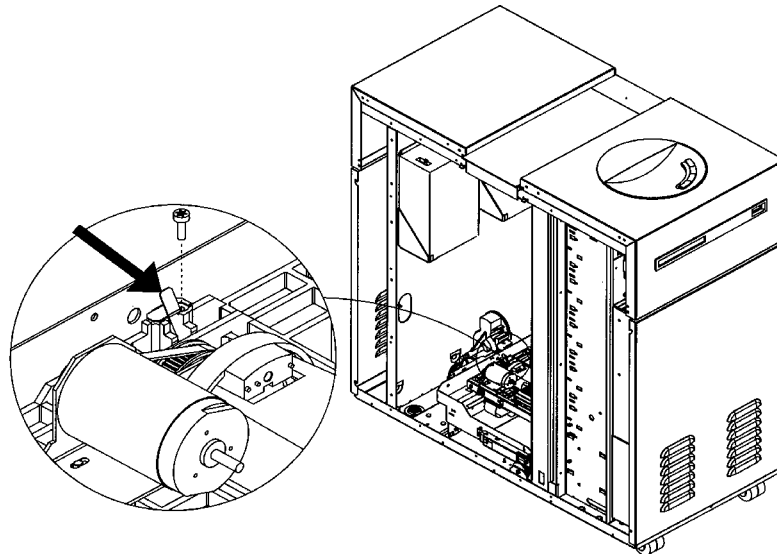


Figure 64: Releasing the Picker Capture Bracket

7. Remove the capture spring by pulling it up and out of the unit.
8. Rotate the capture bracket 90 degrees and pull the bracket down and out (see [Figure 65](#)).

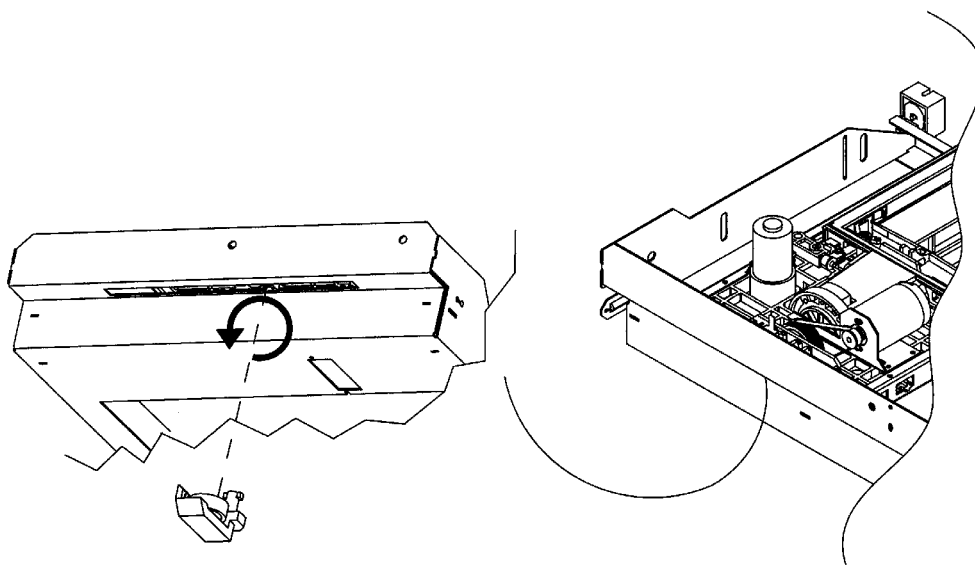


Figure 65: Removing the Translate Frame Capture Bracket

9. Remove the tool you inserted into the rear of the vertical motor gear box and lower the translate frame and picker to the bottom of the jukebox.
10. Tilt up the rear end of the picker and slide it out toward the back (see [Figure 66](#)).

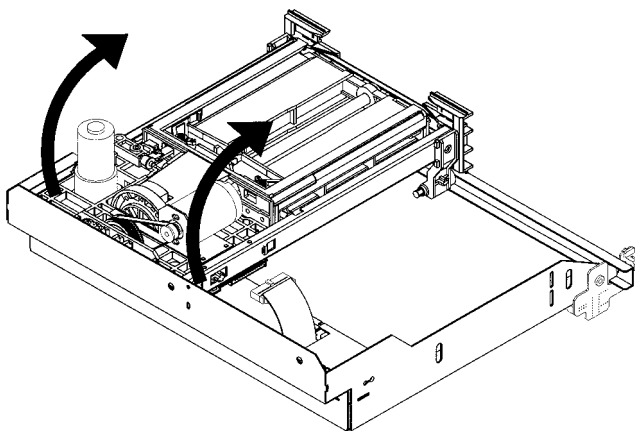


Figure 66: Rotating the Picker Assembly Out of the Translate Frame

Removing/Replacing the Translate Frame (Including the Picker)

1. Remove the three left-side access panels (see “[Access for 3800ux/7100ux Models](#)” on page 46).
2. Remove the lower and middle right-side access panels.



Caution: Raise the translate frame only by pulling on the vertical drive rope. The frame can be twisted by pulling it by the sides. A twisted frame may cause various errors in operation.

3. Raise the translate frame up approximately midway up and secure it with a screwdriver inserted into the hole on the rear of the vertical motor gear box (see #2 on [Figure 67](#)).

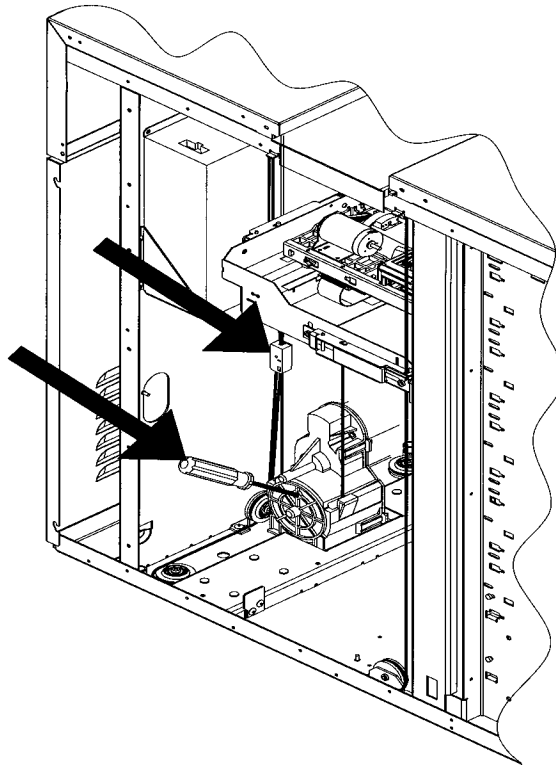


Figure 67: Raising the Translate Frame and Holding the Frame in Position

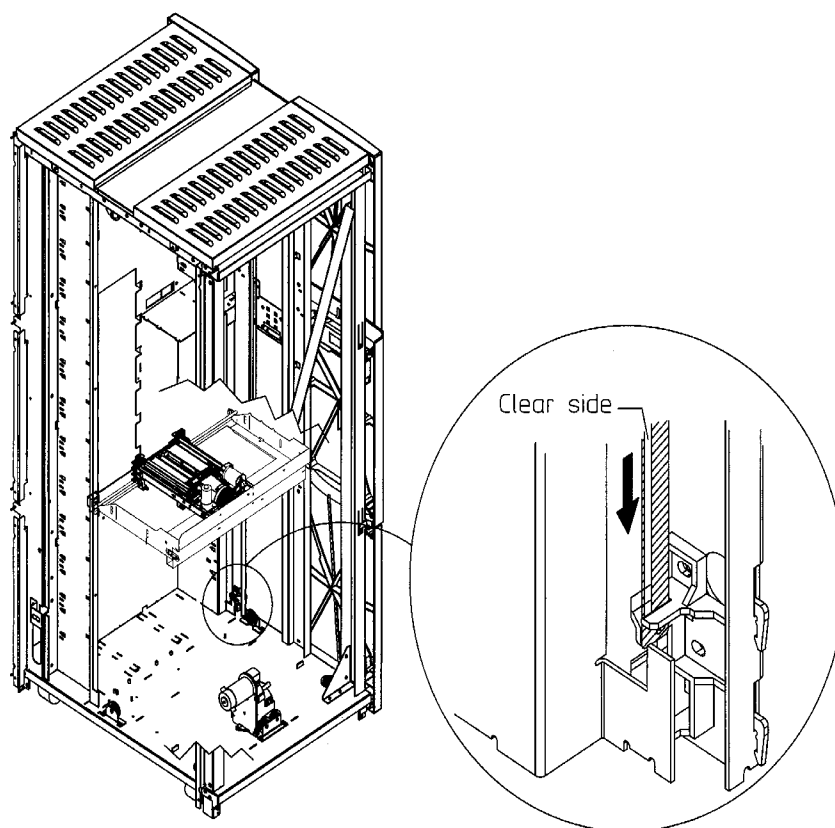


Figure 68: Releasing the Lower End of the Vertical Encoder Strip

4. Unhook the encoder strip and hang it out of the way (see [Figure 68](#)).

Pull down on the bottom of the encoder strip to release the strip from its retaining peg. Once released, the strip will slide up and out of the plastic guide.



WARNING: The edges of the vertical encoder are sharp. Be careful.



Caution: Handle the encoder strip with care and **ONLY BY THE SOLID SIDE** (see [Figure 68](#)). The **CLEAR** side is made up of very fine slits and **CAN BE EASILY DAMAGED**.

5. Remove the “visual locator” bracket on the (front) side of the picker translate frame (see [Figure 69](#)).

Remove the T-20 screw holding the bracket and rotate the bracket off.

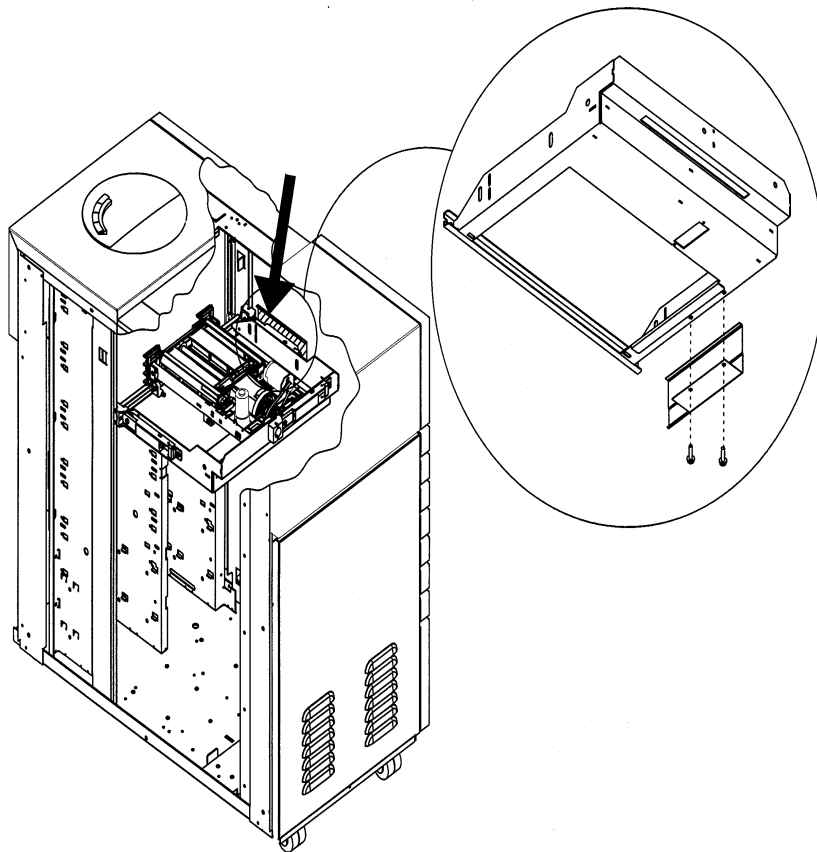


Figure 69: The Visual Locator Bracket

6. Disconnect the umbilical cable on the underside of the translate frame (see [Figure 70](#)).

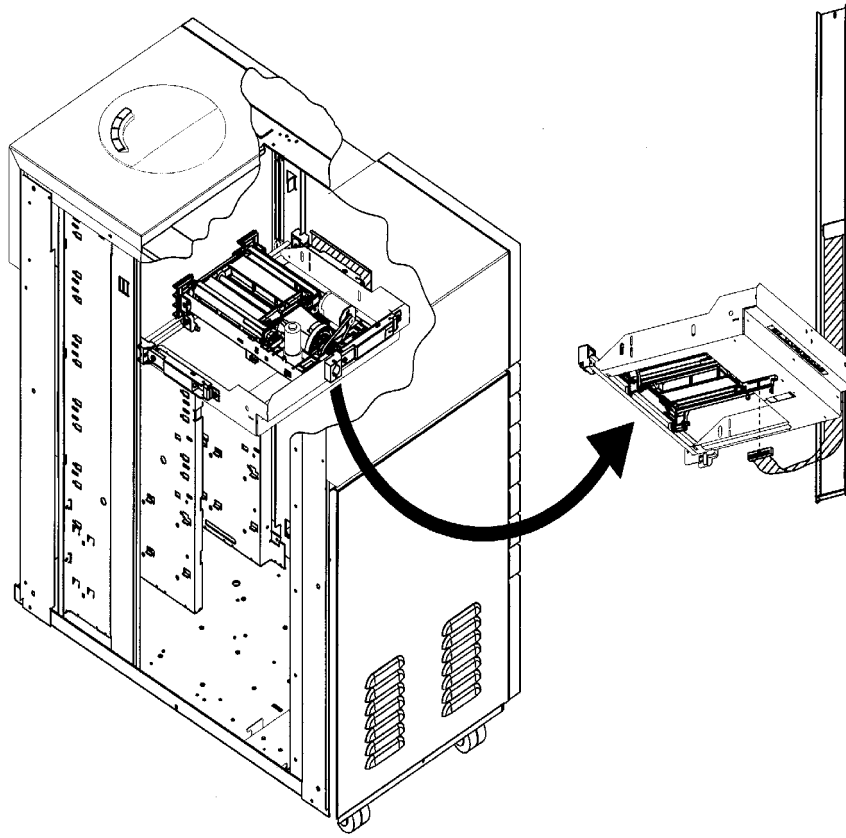


Figure 70: Disconnecting the Vertical Umbilical Cable From the Translate Frame

7. Remove the tool you inserted into vertical motor gear box and move the translate frame down to the bottom of the jukebox.

8. Remove the three rope tensioners from the frame (#1, #2, and #3 on [Figure 71](#)).
 - a. Remove two T-25 long screws per tensioner. Start with the tensioner at the rear end of the frame (#1 on [Figure 71](#)).
 - b. Pull all three rope tensioners free of the translate frame.
 - c. Pull the *rear* tensioner upwards to raise all three tensioners up and out of your way.

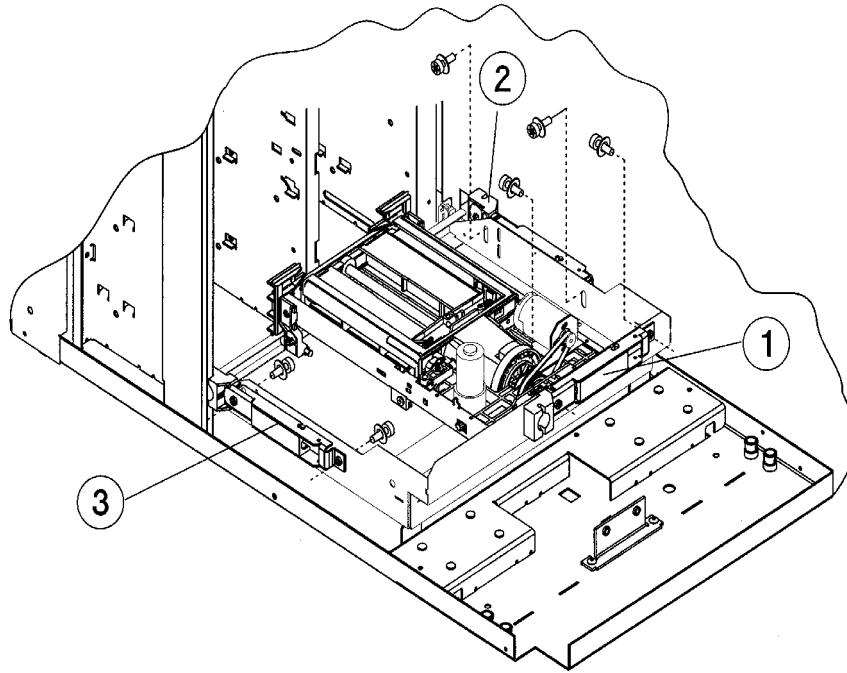


Figure 71: Removing the Tensioners From the Translate Frame



Caution: In the next step, ensure that the plastic rail guides are not damaged when the translate frame is removed.

9. Rotate the rear of the translate frame up and then remove the frame out to the side (see [Figure 72](#)).

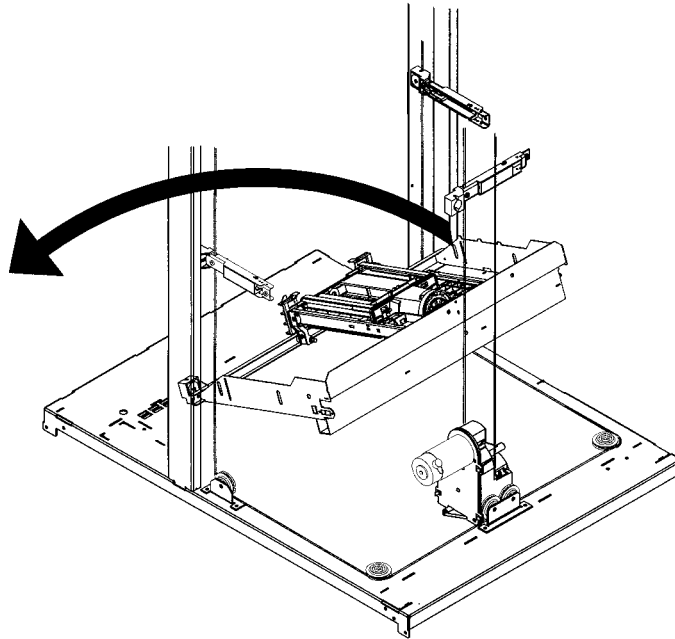


Figure 72: Rotating the Translate Frame Out of the Chassis

Reassembly Notes

Note: Take care to install the translate frame properly. If the frame is not mounted level, errors will be caused that will prevent the library from operating. The following steps explain proper mounting of the frame.

1. Place the frame back in the chassis. Let it rest on its support points. The rear of the frame rests on a ledge on the vertical motor.
2. Pull the tensioners down so that they are next to their mount points on the sides and rear of the translate frame. Press them into the side of the translate frame.
3. While tightening the mounting screw in a tensioner, push down on the frame at that point to make sure that the translate frame remains on its lower stop while you tighten the mounting screw.
4. Check that the translate frame is mounted level on the cables by centering the picker and pushing the frame down lightly and quickly. If you hear a “click” it means that the frame has slack and needs adjustment.

If adjustment is necessary, remount the frame on the tensioners as described in Step 3 and retest.

Mounting the Vertical Encoder Strip

Move the translate frame up and lock it while reinstalling the encoder strip.

Ensure that the encoder strip passes through the sensor slot on the sensor PCA mounted on the side of the picker frame. The strip may be moved off its mounting peg while you are replacing the translate frame in the chassis.

Removing/Replacing the Encoder Strip

1. Remove the three left-side and three rear access panels (see “[Access for 3800ux/7100ux Models](#)” on page 46).



Caution: Raise the translate frame only by pulling on the vertical drive rope. The frame can be twisted by pulling it by the sides. A twisted frame may cause various errors in operation.

2. Raise the translate frame up approximately midway up and secure it with a screwdriver inserted into the hole on the rear of the vertical motor gear box (see #2 on [Figure 73](#)).

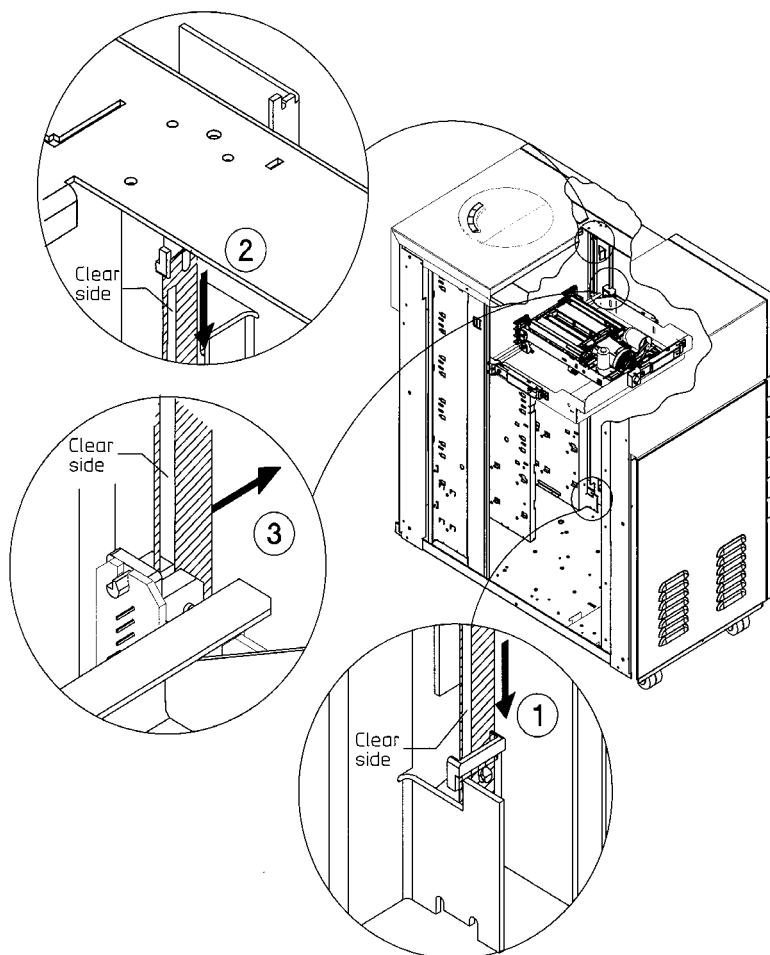


Figure 73: Releasing Both Ends of the Vertical Encoder Strip



WARNING: The edges of the vertical encoder are sharp. Be careful.



Caution: Handle the encoder strip with care and ONLY BY THE SOLID SIDE. The CLEAR side is made up of very fine slits and CAN BE EASILY DAMAGED.

3. Pull the lower end of the encoder strip down (#1 on [Figure 73](#)).
The strip will come off its mounting peg.
4. Take the upper end of the encoder strip off the spring on the upper strip mount (see #2 on [Figure 73](#)).

Reassembly Notes

Carefully mount the encoder strip on the top spring. Route the strip to the lower encoder mount while making sure that the strip passes through the strip reader on the front corner of the translate frame.

Replacing the Vertical Motion Motor

1. Remove the lower left-side access panel (see “[Access for 3800ux/7100ux Models](#)” on page 46).

Extra panels are removed in [Figure 74](#) for parts visibility in this description.

2. Disconnect the red and black power cables to the vertical motor (see [Figure 74](#)).

Note: Note the orientation of the motor before removing it in the next step. The motor must be replaced in the same position on reassembly.

3. Remove two T-15 motor mounting screws on the gear box. Remove the motor (see the arrows on [Figure 74](#)).

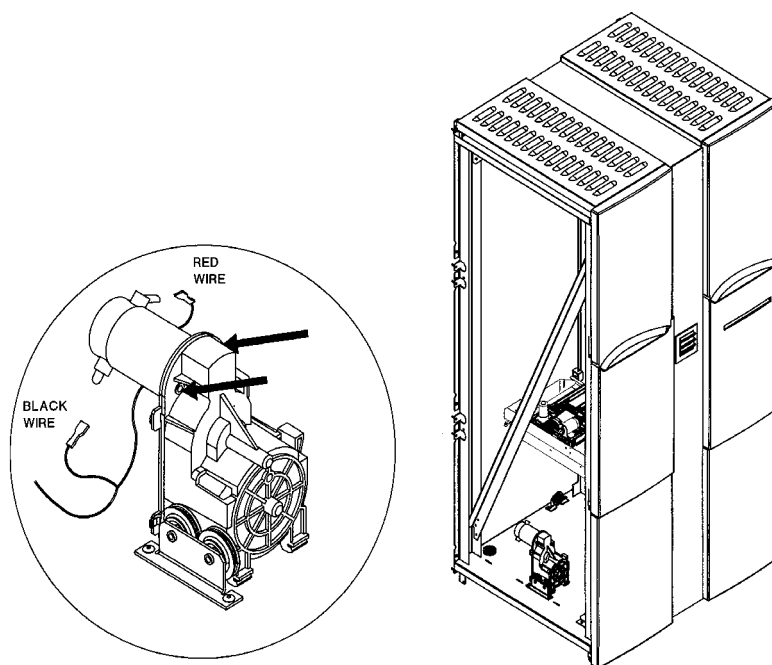


Figure 74: Cables and Mounting Screws on the Vertical Motion Motor

Reassembly Notes

When replacing the motor, use the orienting pegs on the motor to place the motor correctly on the gear box.

Replacing the Vertical Motor Gear Box

1. Remove the three left-side access panels (see “[Access for 3800ux/7100ux Models](#)” on page 46).
2. Follow the steps in “[Removing/Replacing the Translate Frame \(Including the Picker\)](#)” to remove the picker and translate frame.
3. Pull the rear tensioner upwards to raise all three tensioners up to a convenient working height (see #1 on [Figure 75](#)).

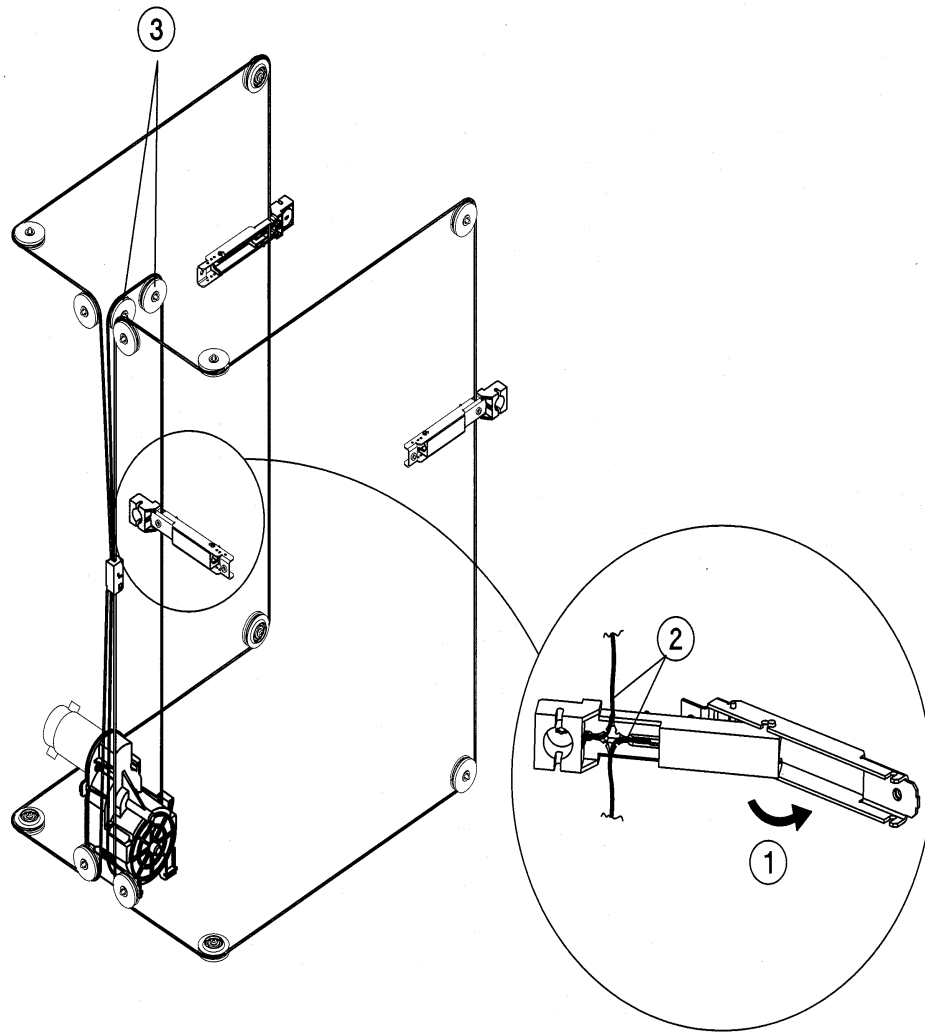


Figure 75: Opening the Tensioners to Relieve Cable Tension

4. Release the tension on the rear rope tensioner (drive rope) using the following steps (see [Figure 75](#)):
 - a. Pull back the metal section (#1) to release tension on the metal securing tab seated in the plastic section.
 - b. Swing the metal section out and off the pivoting pegs on the plastic section.
5. Remove the drive rope from the rear tensioner.
 - a. Unfasten the spring.

- b. Pull both ends of the rope out of the tensioner.
6. Remove the drive cable from the top pulleys (#3 on [Figure 76](#)).
7. Remove the T-15 screw from the rope coupler cover (see #1 on [Figure 76](#)).

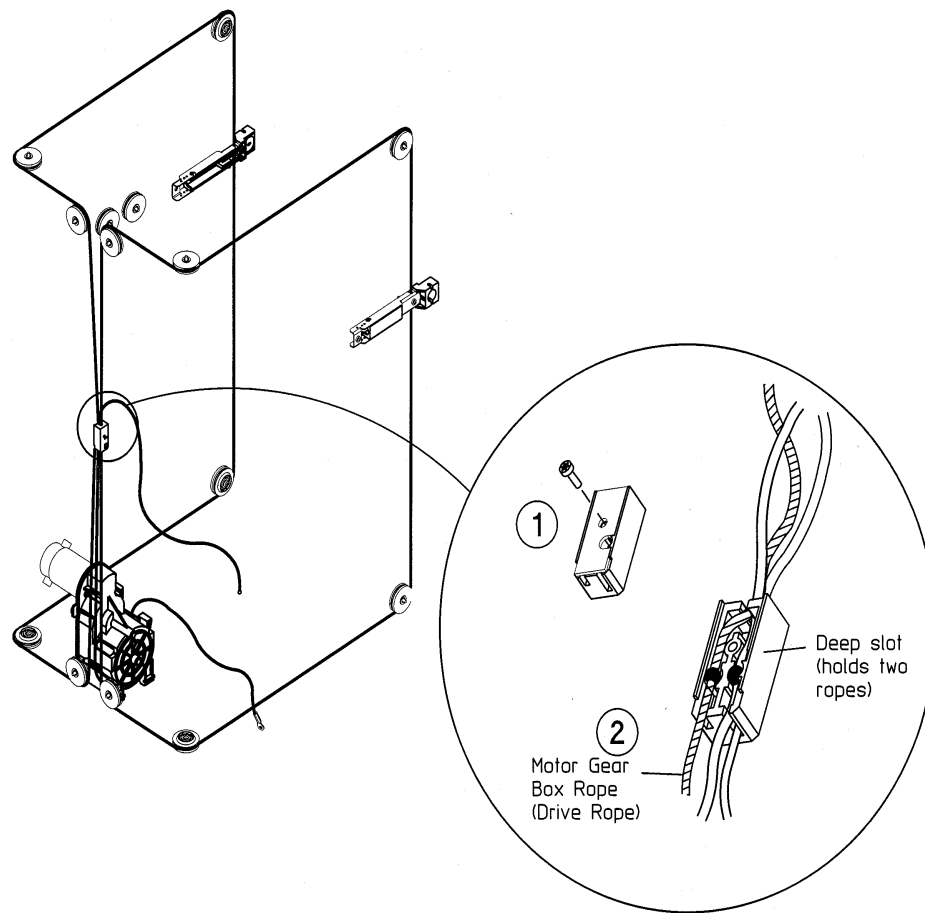


Figure 76: Disconnecting the Rope Coupler

8. Remove the front and center ropes from the rope coupler (#2 and #3 on [Figure 76](#)).

Note: The top and bottom ropes in the coupler are slave ropes. The center rope is the drive rope.

9. Remove the gear box by removing one T-25 screw from the base of the gear box. Tip the gear box forward and lift it out (see [Figure 77](#)).

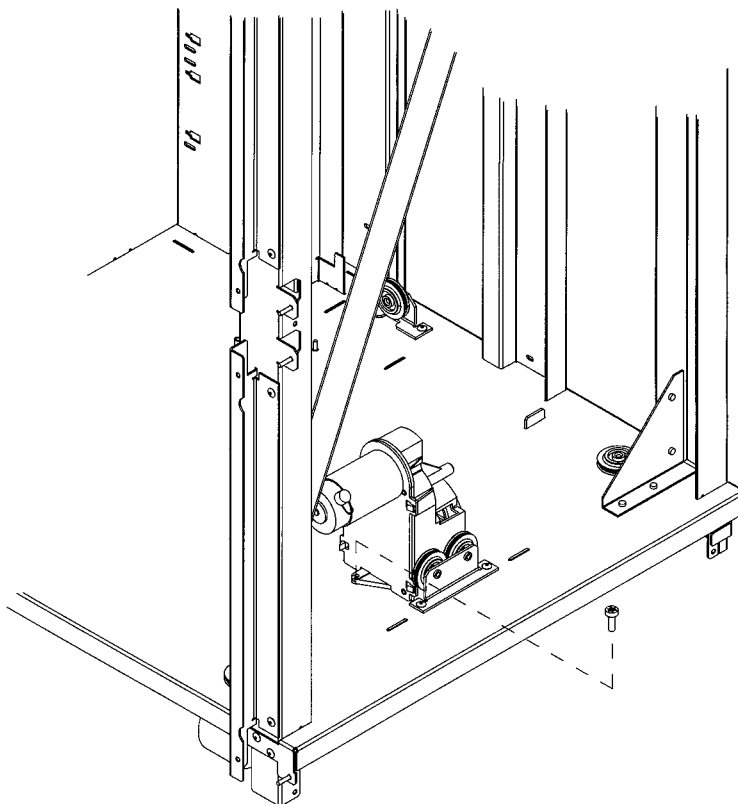


Figure 77: Vertical Motor Gear Box Mounting Screw

Reassembly Notes

When remounting the rear rope tensioner on the drive rope, position the tensioner so that the spring is on the right side. The position of the tensioner is shown in the enlarged tensioner in [Figure 78](#).

It is recommended that you mount and secure the tensioners on the translate frame in the order shown on [Figure 78](#).

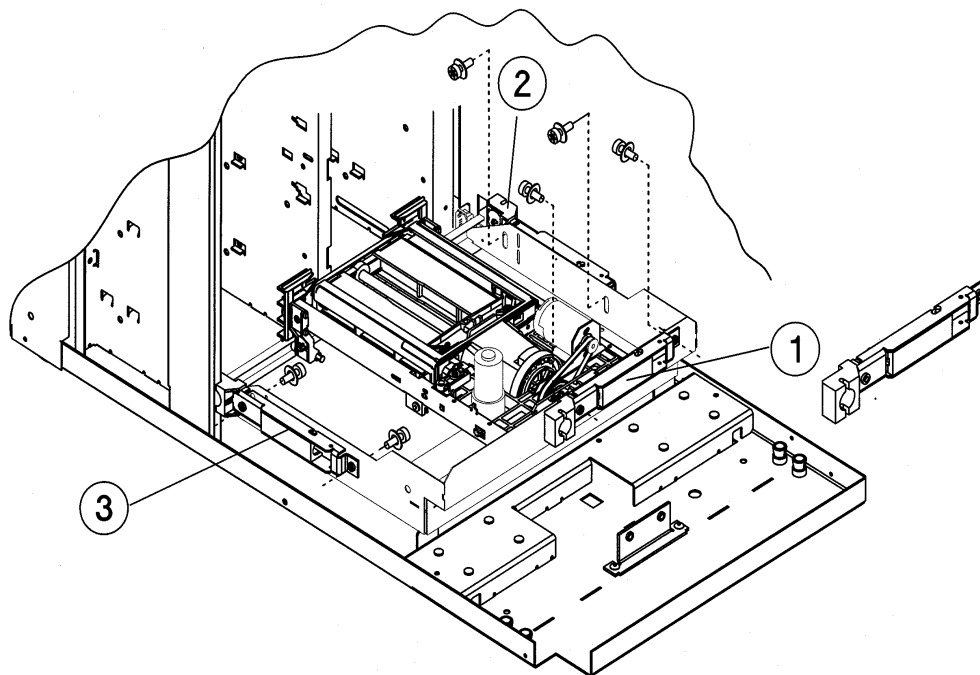


Figure 78: Positioning the Tensioner to Mount on the Translate Frame

To give yourself enough rope slack, fasten the drive rope ends to the rope tensioner *before* hanging the drive rope over the top two pulleys (see #2 [Figure 78](#)).

Before applying tension by setting the rope tensioners, insert the ropes into the rope coupler and attach the coupler cover plate (see [Figure 78](#)).

Reinstall the translate frame on the ropes as described in the reassembly notes in the procedure for “[Removing/Replacing the Translate Frame \(Including the Picker\)](#)” on page 111.

Replacing the Controller PCA

1. Remove the three right-side access panels and the lower and upper RFI panels (see [“Access for 3800ux/7100ux Models”](#) on page 46).
2. Remove all cables from the controller PCA (see [Figure 79](#)).
 - #1 - input power to the PCA
 - #2 - 24 V output
 - #3 - 24 V output to vertical motor
 - #4 - picker umbilical cable
 - #5 - GPIO
 - #6 - SCSI cable
3. Remove the seven T-20 screws holding the controller PCA to the chassis (see arrows on [Figure 79](#)).
4. Remove the PCA.

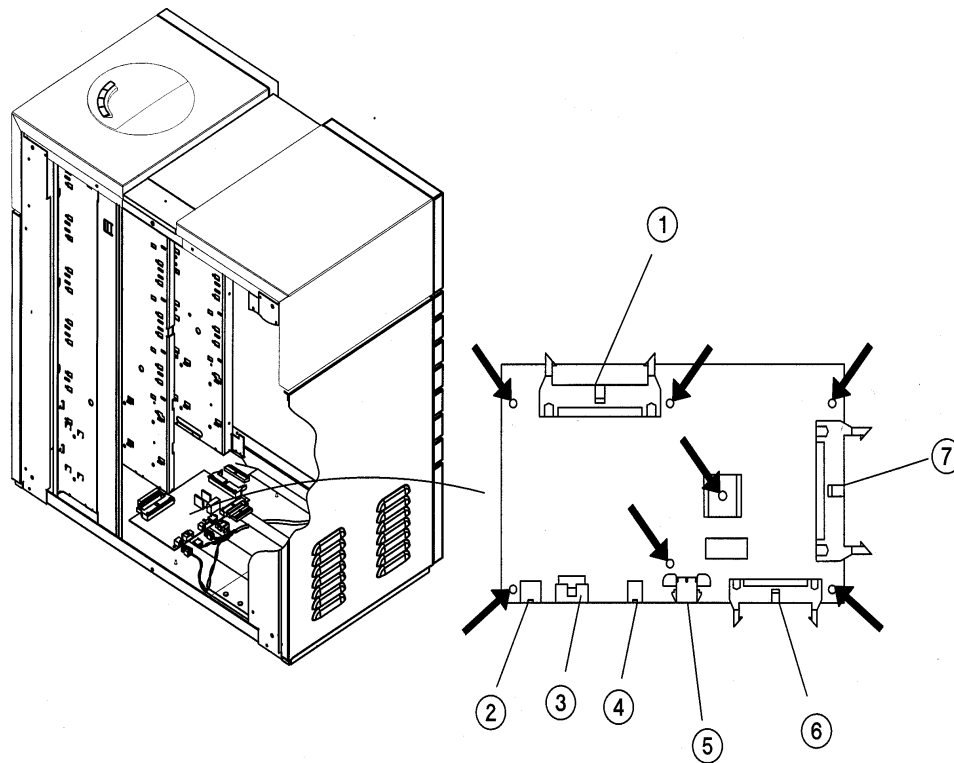


Figure 79: Controller PCA Cables and Mounting Screws

Replacing the Power Distribution PCA

1. Remove the lower right-side access panel (see “[Access for 3800ux/7100ux Models](#)” on page 46).
2. Remove the power cable and other power distribution cables from the PCA. See [Figure 80](#).
 - #1 - 24 V input to the controller PCA
 - #2 - 24 V from 24 V supply
 - #3 - input to the lower 5/12 V power supply
 - #4 - input to the upper 5/12 V power supply
 - #5 - ground strap
 - #6 - line input
3. Remove the power distribution PCA.
 - a. Remove the T-20 screw on the static strap (strap is #5 on [Figure 80](#)).
 - b. Remove the other six T-20 screws holding the PCA. Four screws are on the PCA and two are on the power plug bracket (see [Figure 80](#)).

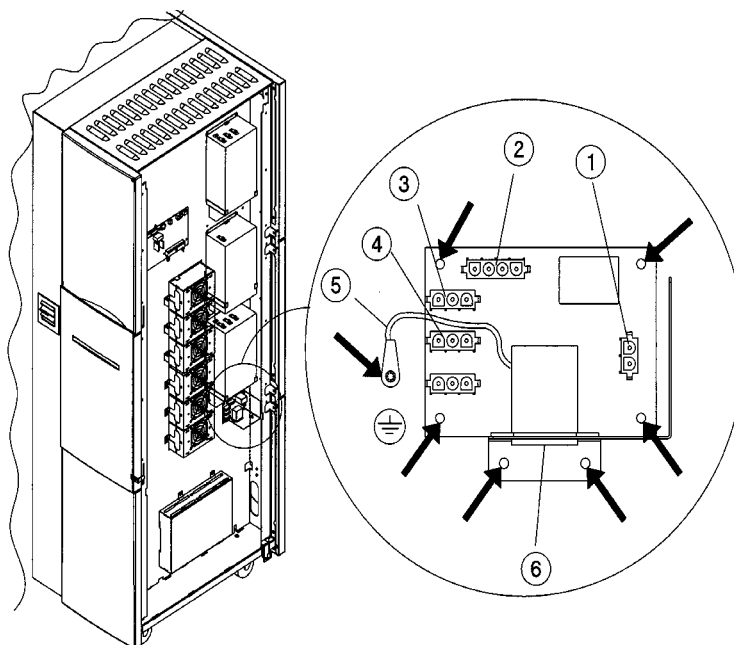


Figure 80: Power Distribution PCA

Replacing a Buffer Assembly

1. Remove the lower right-side access panel (see [“Access for 3800ux/7100ux Models”](#) on page 46).
2. Remove the four T-20 screws that mount the assembly enclosure. Remove the enclosure.

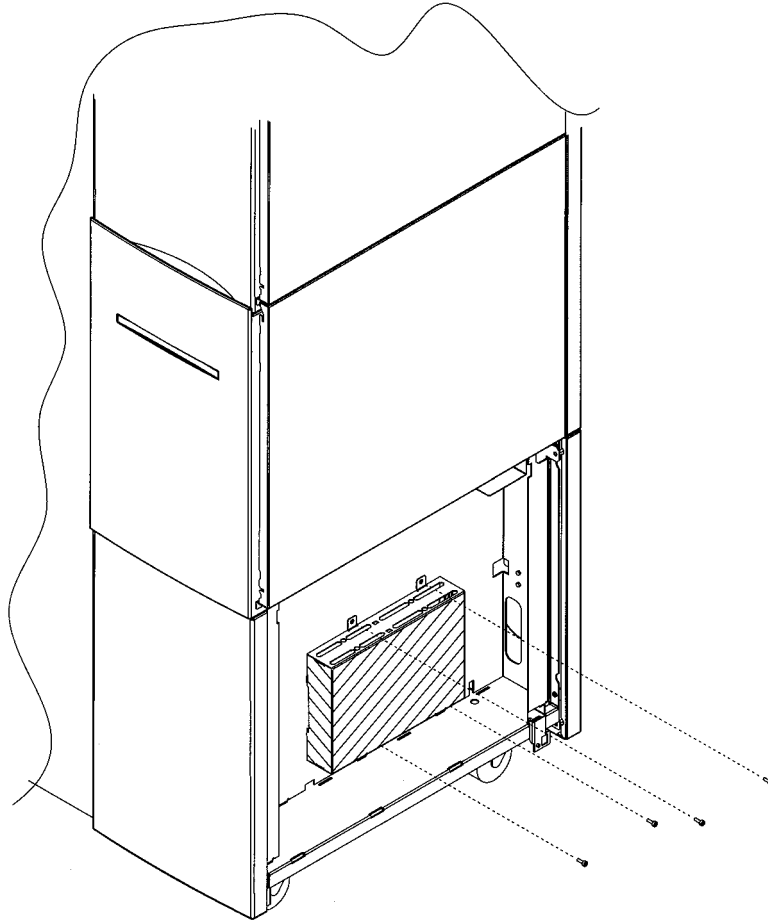
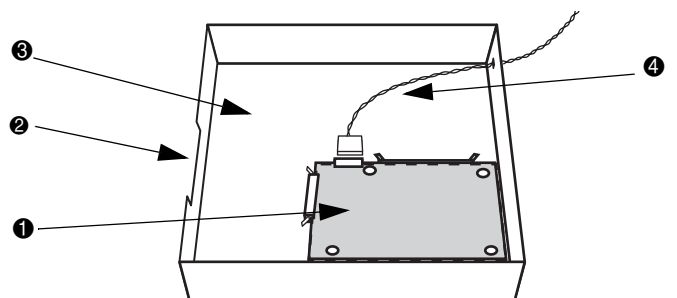


Figure 81: Unmounting the assembly enclosure

3. Remove all cables (power and SCSI) from the buffer assembly.
4. Remove the four T-15 screws that mount the buffer board to the inside of the module.

Note: Depending on the model, one or two buffer boards may be mounted in the module.



- | | |
|---------------------|-------------------------------|
| ❶ Buffer board | ❸ Buffer board module |
| ❷ Cable access slot | ❹ Power cable to buffer board |

Figure 82: Buffer board cabling

5. To install the replacement buffer assembly, repeat steps 1 through 4 in reverse order.

Replacing the Vertical-Path-Clear PCA

1. Remove the lower rear access panel (see “[Access for 3800ux/7100ux Models](#)” on page 46).
Extra panels are removed in [Figure 83](#) for parts visibility in this description.
2. Remove the three T-20 screws that mount the PCA cover (#1 on [Figure 83](#)).
3. Remove the cable from the rear of the PCA (#2 on [Figure 83](#)).
4. Remove the six T-20 screws that mount the PCA to the chassis (#3 on [Figure 83](#)). Remove the PCA.

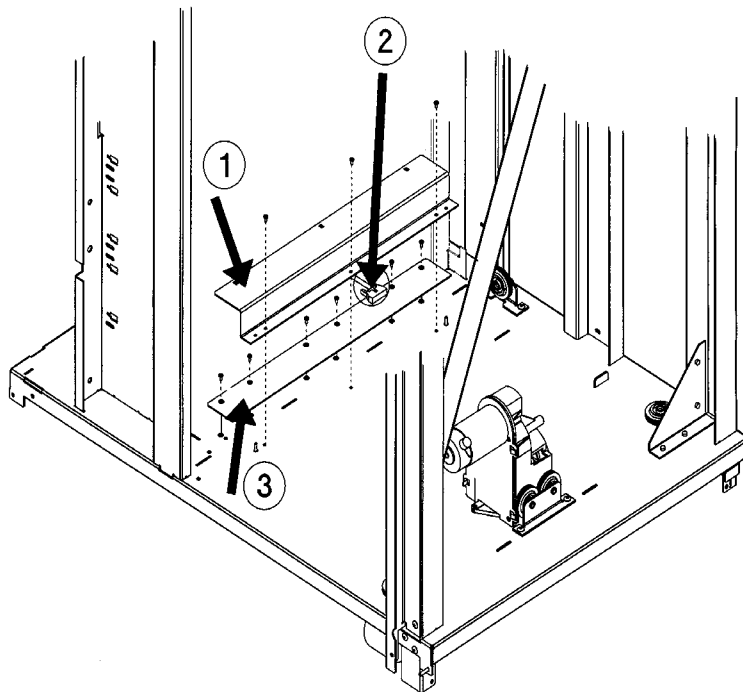


Figure 83: Vertical-Path-Clear Enclosure and Mounting Screws

Checking the RFI Adjustments

Note: The following RFI adjustments must be maintained after servicing the jukebox. Depending on the service performed, these configurations may be altered. The purpose of this section is to remind you of the RFI adjustments that must remain in place.

Refer to [Figure 84](#) on the next page for the discussion below.

Be sure that there is an RFI clamp holding the front panel cable to the chassis as shown by #1.

Be sure that the RFI clamps (#3) around the SCSI cable (or cables) below the lower interposer PCA (#4) are placed as close to the bottom of the interposer PCA as possible.

Place the thin cable clamps on the cables as shown by #5. The goal is to hold the cables as close to the chassis body as possible.

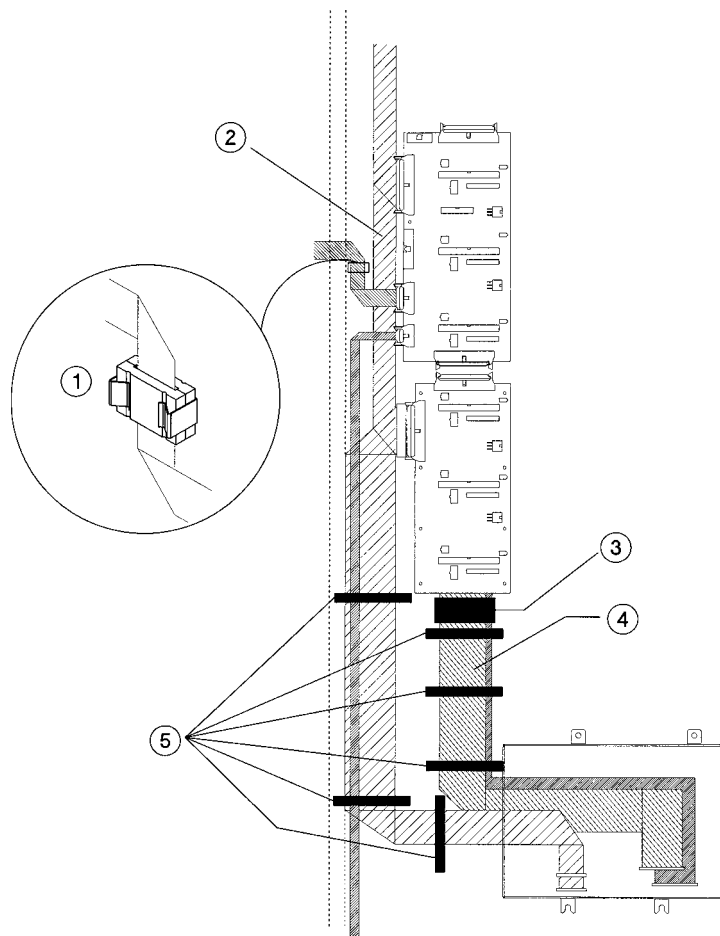


Figure 84: RFI Adjustments

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